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PRS-UST-87-012  
5 JULY 1987



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# ***JPRS Report***

# **Science & Technology**

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## ***USSR: Science & Technology Policy***

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SCIENCE & TECHNOLOGY  
USSR: SCIENCE & TECHNOLOGY POLICY

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## BUDGET AND FINANCE

### STATUTE ON PRODUCTION, SCIENCE, TECHNOLOGY DEVELOPMENT FUND

Moscow EKONOMICHESKAYA GAZETA in Russian No 49, Dec 86 p 17

[Model Statute on the Procedure for the Formation and Utilization of the Fund for the Development of Production, Science and Technology by Production Associations and Enterprises Operating Under the Conditions of Full Cost Accounting and Self-Financing. Approved by the Commission for the Improvement of Management, Planning and the Economic Mechanism (Protocol No 30 of 23 October 1986), Ratified by USSR Gosplan]

[Text] Formation of the Fund for the Development of Production, Science and Technology

1. The fund for the development of production, science and technology (FDPST) is formed at associations and enterprises (Footnote 1) (Hereinafter called "enterprises") by means of:

--amortization deductions intended for the complete restoration of fixed capital;

--deductions from profit, which is left at the disposal of enterprises, according to norms established as a percentage of it;

--receipts from the sale of surplus property included in fixed capital (less the expenditures related to the liquidation of this property) and receipts from the culling of livestock.

Assets of a ministry's centralized FDPST may be channeled into the formation of the FDPST of enterprises, which are planned to operate with a loss and have a low profitability.

The norms of the formation of the FDPST are presented to enterprises as part of the control figures before the start of the compilation of the five-year plan. In necessary cases the norms presented to the enterprises as part of the control figures can be revised during the drafting of the five-year plan.

The norms of the formation of the FDPST, which are approved for enterprises in the five-year plan, are not liable to change and reconfirmation.

2. In consultation with the appropriate trade union committees (councils) the ministries approve the norms of the formation of the FDPST, which are stable for the 5-year period (with a breakdown by year), for subordinate enterprises. Here their size may be differentiated by specific enterprises depending on the degree of wear of the fixed capital.

3. When the norms of the formation of the FDPST are being confirmed, conformity between the amounts of this fund for the various enterprises and its amount for the ministry as whole with allowance made for the assets funds of the centralized FDPST should be ensured.

When the norms of the formation of the FDPST are being established for enterprises, the expenditures, which are financed prior to the transition to full cost accounting by means of budget assets, the unified fund for the development of science and technology, the profit and other internal assets, which are envisaged in the five-year plan, are taken into account. A model list of the expenditures, which are taken into account during the determination of the norms for the formation of this fund, is cited in Appendix 1.

4. The absolute amounts of the FDPST for enterprises are specified in the five-year plan (with a breakdown by year) and the annual plans on an estimated basis.

The absolute amount of the FDPST is determined by multiplying the magnitude of each of the values the fund-forming indicators stipulated in the plan by the corresponding norm. Included in the absolute planned amount of the fund are receipts from the sale of surplus property and from the culling of cattle, as well as the assets obtained by enterprises from the ministry's centralized FDPST. (Footnote 2) (Or another analogous centralized fund of the ministry)

5. The breakdown of the absolute sum of the FDPST in the annual plan by quarters is made in proportion to the quarterly breakdown of the fund-forming indicators, of the amount of receipts from the sale of surplus property and the culling of cattle, as well as the assets of the ministry's centralized FDPST in the amounts allotted to the enterprise.

Procedure of the Deduction by Enterprises of Assets for the FDPST in the Course of the Year

6. The deductions for the FDPST from the profit, which is left at the disposal of an enterprise, and from the amortization deductions, which are intended for the complete restoration of fixed capital, are made quarterly by enterprises in a cumulative amount (the quarter, half a year, 9 months, and the year).

An example of the calculation of the FDPST is cited in Appendix No 2.

7. The actual deductions for the FDPST are determined by multiplying the corresponding norms by the actually obtained amount of the profit, which is left at the disposal of the enterprise, and the actually credited amount of

the amortization deductions, which are intended for complete restoration of fixed capital.

Included in the absolute actual size of the fund are the actual amount of receipts from the sale of surplus property and from the culling of cattle, as well as the assets, which were obtained by enterprises from the ministry's centralized FDPST.

8. There can be channeled into the FDPST:

--assets of the enterprise's financial reserve;

--a portion of the assets which the enterprise obtains from other enterprises which use its scientific and technological developments (documentation);

--a portion of the profit which was actually obtained by the enterprise from the sale of consumer goods and items for production engineering purposes, which were manufactured from production wastes;

--other deductions stipulated by existing legislation.

#### Procedure of the Utilization of FDPST Funds by Enterprises

9. The assets of the FDPST are utilized by enterprises independently on the basis of estimate. A draft of the estimate of expenditures is submitted for discussion by the enterprise's labor collective and after its approval is ratified by a joint decision of the administration and the trade union committee and is attached to the collective agreement. The administration and trade union committee inform the workers and employees about the fulfillment of the indicated estimate within the time periods stipulated by the collective agreement.

10. The assets of the FDPST, including the assets of this fund, which were not utilized during the past year, can be channeled into:

a) the financing of expenditures on the retooling, renovation and expansion of existing production.

In individual cases, when this is necessary for the implementation of measures on the retooling of production, the enterprises have the right at the expense of the FDPST to carry out new construction of plantwide and auxiliary facilities (warehouses, boiler houses, compressor and transformer substations, engineering networks, nature conservation and other facilities, as well as the renovation of on-site personal service facilities).

Retooling plans are drafted and approved by enterprises. First of all such measures, which ensure the acceleration of the pace of the replacement of obsolete productive capital and the performance of work in the shortest possible time, are included in the retooling plans.

- b) the financing of expenditures on the preparation and assimilation of new and modernized products, the production of prototypes, and the introduction of advanced technological processes;
- c) the carrying out of scientific research, experimental design and planning operations (including the acquisition of licenses), the financing of expenditures to acquire equipment, instruments and other commodity stocks;
- d) the reimbursement of the increased expenditures on the production of a new product during the period of its assimilation;
- e) the financing of the increase of the norm of internal working capital;
- f) the financing of the expenditures of participation in the construction, renovation, repair and maintenance of local roads;
- g) the organization and development of subsidiary farms;

By means of the indicated assets agricultural machinery, mechanisms, livestock, poultry, seed stock, and others can be acquire, and the necessary construction and installation work can also be performed.

- h) the creation and expansion of capacities for the production of consumer goods and the provision of consumer services;
- i) the reimbursement of the expenditures, which are connected with the obtaining in accordance with established procedure of design documentation (developments) for reuse and the provision of assistance in its utilization;
- j) the repayment of long-term and other bank credits, which were granted to the enterprise and which in accordance with prevailing legislation are paid off at the expense of the FDPST, as well as the payment of interest on these credits. The settlements with banks are made in a priority manner;
- k) the financing of other expenses in conformity with prevailing legislation (including nonproduction construction).

11. Enterprises have the right in consultation with labor collectives to transfer a portion of the assets of the FDPST to:

--related enterprises, construction and scientific research organizations for the stimulation of the solution of complex technical problems, as well as the rapid completion of the work on the retooling of fixed capital, which is being performed under the conditions of operating production;

--other enterprises of the executive committees of local soviets of people's deputies by way of sharing in the construction, expansion or renovation of facilities of the sewage system, water, gas, heat and electric power supply, communications, access roads and other jointly used facilities (including those which are part of industrial centers).

12. A production association, which has under its jurisdiction enterprises which are carried on an independent balance sheet, is granted the right to centralize a portion of the assets of the FDPST.

13. The planning estimates and title lists for retooling, as well as for the construction of facilities of subsidiary farms, which are carried out at the expense of the FDPST and bank credits, are drawn up by enterprises independently and are confirmed by their managers.

When necessary within the limit of planning and surveying work the drawing up of planning estimates is carried out by planning organizations on the basis of assignments which have been approved by the managers of the enterprise.

During of the year the planning and surveying organizations have the right to accept in addition orders from enterprises for the drawing up of planning estimates for retooling with the transfer by clients, if necessary, of the corresponding limits on the number of personnel and the wage fund.

Enterprises, which perform at their own expense work the retooling and renovation of operating works using their own resources, establish independently the deadlines for the drawing up and turning over of planning estimates subject to the specific conditions for the performance of the work.

14. The assets of the FDPST, which are allocated by enterprises for capital construction, are taken into account fully by the ministry in the draft plan of capital investments and are backed in a priority manner with limits of contracting, planning, and surveying work in the amounts submitted by the enterprises (with allowance made for the amount of work which is being performed using the enterprises' own resources).

In the ministry's five-year plan and annual plans the amounts of capital investment, construction, installation, and contracting work, as well as the placement into operation of fixed capital, production capacities and facilities at the expense of the FDPST are taken into account in accordance with proposals of the enterprises.

15. The provision with material and technical resources (with the exception of newly developed and imported equipment) of the work, which is being performed using the enterprises' own resources at the expense of the FDPST and bank credits is carried out according to the procedure established by USSR Gosplan and USSR Gosplan.

16. The provision with material and technical resources of the work, which is being fulfilled on a contractual basis at the expense of the FDPST and bank credits, is carried out according to the procedure established by Paragraph 21 of Decree No 387 of the CPSU Central Committee and the USSR Council of Ministers of 29 April 1984.

17. The councils of ministers of the union and autonomous republics and the executive committees of the soviets of people's deputies ensure in a priority manner the allocation to enterprises in accordance with their orders of local construction materials and items made of these materials for fulfillment with



the use of the enterprises' own resources of the work at the expense of the enterprise's own assets and bank credits.

18. For the financing of measures on retooling at the expense of the FDPST the enterprises submit to bank institutions an excerpt from the retooling plan for the year being planned and the approved estimates for individual types of work and expenditures and when obtaining credit, moreover, the calculations of the economic efficiency of the planned measures.

The estimates expenditures, which have been approved by the managers of the enterprises, are the basis for financing the research and development which are performed at the expense of the FDPST.

19. The payment for equipment, which is acquired at the expense of the FDPST, to replace worn-out equipment and of cost of its installation is made on the basis of submitted bills within the limit of the assets available in the enterprise's account for the depositing of assets of the FDPST.

20. If the assets of the FDPST are inadequate, enterprises may utilize credits from USSR Stroybank and USSR Gosbank, which are issued by them within the limits of the plan of long-term lending:

--for planned expenditures connected with the implementation of measures on the retooling, renovation and expansion of operating enterprises, on the condition of the recovery of the capital investments within the limits of the average sectorial norms;

--for the implementation of highly effective measures on retooling (the need for which arises during the fulfillment of the plan) in excess of the limit of state capital investments on the condition of the reimbursement of the expenditures (with allowance made for the specific nature of the sectors) within a period of up to 5 years.

21. The assets of the FDPST, which were credited in the current year in excess of the amounts specified in the plan, as well as the assets, which were not utilized in previous years, can be expended in excess of the expenditures, which were stipulated in the annual estimates of spending of the fund, which were approved by the enterprise, as the material resources necessary for this are found.

22. The assets of the FDPST are not liable to confiscation from enterprises and can be accumulated by them for the implementation of necessary measures in subsequent plan periods.

The temporarily idle assets of the FDPST can be utilized by banks as resources for the issuing of credits for the retooling, renovation and expansion of production.

Bank institutions pay enterprises 0.5 percent per annum for the use of the assets of their FDPST.

The assets of the FDPST are deposited and utilized at institutions of USSR Gosbank. The portion of the assets, which is stipulated in the estimate of the expenditure of this fund for the financing of capital investments, is transferred to institutions of USSR Stroybank.

23. The transfer of the assets of the FDPST to individual accounts to be held to bank institutions is carried out on the dates agreed upon with the bank institution, but no less frequently than once a month. At the end of the quarter recomputations are made in accordance with the deductions actually made to the fund. Insufficiently transferred amounts are deposited in the individual account at the same time as the regular payment, and excessively transferred amounts may be credited toward forthcoming payments or returned to the enterprise.

24. Enterprises include the cost of the work on the assimilation of new equipment, which is paid for at the expense of the FDPST, in the volumes of production and sold output. Nonfulfillment of the assignments envisaged by the plan on the placement into production of items of new equipment, which are financed by means of the indicated assets, is taken into account when evaluating fulfillment of the plan for the sale of output on the basis of delivery obligations in conformity with concluded contracts (orders).

The ministry in consultation with USSR Gosplan, the USSR Ministry of Finance and the All-Union Central Council of Trade Unions, determines the characteristic features of the application of the this Model Statute, which follows from the specific nature of the work of the sector.

The statute go into effect on 1 January 1987.

#### Appendix No 1

A Model List of the Items of Expenditures, Which Are Taken Into Account When Determining the Norm for the Formation of the Fund for the Development of Production, Science and Technology

1. The production development fund (according to established norms).
2. The assets which are allocated for the financing of centralized capital investments (excluding new construction according to an agreed-upon list of facilities).
3. The assets which are stipulated in the financial plan for planned expenditures before the transition to full cost accounting:
  - the increase of the norm of internal working capital;
  - the fund of the enterprise (organization). No less than 20 percent of an fund of the enterprise is channeled into the FDPST;
  - the consumer goods fund (in the part which is channeled into the expansion of production and the improvement of product quality);

--the unified fund for the development of science and technology (in the part which is left to enterprises for performing work on the development and introduction of new equipment, and excluding the assets intended for the payment of prizes);

--other funds;

--deductions for road work;

--operating expenses--total (with the exception of the assets of incentives for invention and assets which are financed from the budget);

--the payment of interest for the use of bank credit (with the exception of nonproduction construction);

--the repayment of loans obtained for the increase of the norms of internal working capital;

--the repayment of long-term bank loans obtained for capital investments (in the area of production construction) and the formation of the basic herd;

--the profit which is left at the disposal of the economic unit (in the area of the profit which is channeled in accordance with prevailing legislation into the development of production, science and technology);

--deductions for the fund to compensate for losses due to the discounting of goods;

--the expenditures on personnel training;

--the excess of the wholesale prices over the retail prices for consumer goods;

--miscellaneous expenditures (in the area of the profit which is channeled in conformity with prevailing legislation into the covering of the expenditures of production, science and technology).

## Appendix No 2

### Example of the Calculation of the Fund for the Development of Production, Science and Technology in the Course of a Year (Conditional Figures)

#### 1. Initial data

Norms of deductions for the fund for the development of production, science and technology, which are approved by the ministry, as a percentage of:

amortization deductions intended for the complete restoration of	
fixed capital.....	100
profit left at the disposal of enterprises.....	60

## 2. Calculation of deductions (millions of rubles)

	1st quar- ter	1st half year	inclu- ding 2d quar- ter	9 months	inclu- ding 3d quar- ter	year	inclu- 4th quarter
1. Amortization							
planned	1.4	2.9	1.5	4.2	1.3	5.7	1.5
actual	1.4	3.0	1.6	4.5	1.5	5.9	1.4
2. Profit							
planned	1.8	3.7	1.9	5.4	1.7	7.2	1.8
actual	1.7	3.6	1.9	5.4	1.8	7.2	1.8
3. Deductions from amortization							
planned	1.4	2.9	1.5	4.2	1.3	5.7	1.5
actual	1.4	3.0	1.6	4.5	1.5	5.9	1.4
4. Deductions from the profit							
planned	1.08	2.22	1.14	3.24	1.02	4.32	1.08
actual	1.02	2.16	1.14	3.24	1.08	4.32	1.08
5. Total deductions							
planned	2.48	5.12	2.64	7.44	1.47	6.42	1.68
actual	2.42	5.16	2.74	7.74	1.68	6.62	1.58

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## FACILITIES AND MANPOWER

### ROLE OF RETIRED SPECIALISTS IN S&T PROGRESS

Moscow TEKHNKA I NAUKA in Russian No 9, Sep 86 p 11

[Article by S. Leznov, member of the scientific and technical society and Honored Power Worker of the USSR, under the rubric "A Reader Suggests": "The Experience of Veterans of Science and Technology for the Country"]

[Text] We are all aware of what imposing tasks on accelerating scientific and technical progress have been set for the sectors of the national economy. The tremendous efforts of the entire Soviet people are needed to carry them out. Each person will need to exert the maximum knowledge and effort. But our scientific and technical veterans could do a particularly great amount. Hundreds of thousands of engineering, technical, and scientific specialists, highly skilled foremen and workers, who have retired, but have retained their mental and physical powers, not only are capable of, but also want and long to make use of their knowledge and professional and life experience to accelerate technical progress and to improve production. They anticipate that in light of the decisions of the 27th CPSU Congress energetic steps will be taken to involve nonworking specialists in activity which is necessary both for the country and for themselves. And it will probably be natural for the scientific and technical societies to take this important work upon themselves.

For all its preceding years and at present the scientific and technical societies for the most part have been carrying out the promotion of knowledge and the discussion of individual questions, have been organizing seminars and competitions, have been participating in technical councils, and so forth. This is no doubt necessary, but absolutely inadequate. The scientific and technical societies should reorganize their activity.

In general, my suggestions are formulated in the following manner.

To begin with, the scientific and technical societies could take upon themselves the identification of capable veterans, the ascertainment of their inclinations and desires, and the formation of specialized groups of these retirees subject to their occupation. Then it is necessary to find in the ministries, departments, organizations and enterprises those important and pressing matters which can be entrusted to the veterans. An organized and gradual changeover to this form of work, the personal interest of specialists in solving those and technical problems to which they will be attracted, the

desire to spend their time in an interesting and useful way, the moral and, possibly, certain material incentives--all this will ensure effective help to the national economy on the part of scientific and technical societies.

In my opinion, it is difficult to overestimate the benefit of this work for our state, for production, and for the specialists themselves, who are taking a well-deserved rest.

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## WORK OF ESSR S&T SOCIETIES ON INTENSIFYING SOCIAL PRODUCTION

Moscow TEKHNKA I NAUKA in Russian No 9, Sep 86 pp 10-11

[Interview with Vladimir Aleksandrovich Kyao, deputy chairman of the Estonian SSR Council of Scientific and Technical Societies, by TEKHNKA I NAUKA correspondent S. Shakhmayev under the rubric "In the Associations and Organizations of Scientific and Technical Societies": "The Main Thing Is the Search!"; date, place, and occasion not given; first paragraph is TEKHNKA I NAUKA introduction]

[Text] The 27th CPSU Congress has set complex and responsible tasks for the scientific and technical community. The entire scientific and production potential and all reserves are being used today to accomplish them. Vladimir Aleksandrovich Kyao, deputy chairman of the ESNTS [Estonian SSR Council of Scientific and Technical Societies], tells to our correspondent how in the Estonian SSR the members of scientific and technical societies are aiding the intensification of social production.

[Answer] The June (1985) conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress and the decisions of the regular party forum in many respects determined the new, intensive forms and methods of performing work, about which I want to talk today. Regarding the party decisions as a program for action, we believe that our basic task is the systematic increase of the contribution of the republic's engineering corps to the acceleration of the further development of the national economy. Such a strategic direction is determining a set of measures aimed at raising the professional level of our members and their competency in many fields of knowledge and at enhancing creative activity. It seems that constant and daily training should become a distinguishing feature of every specialist.

The work of the ESNTS is done, as it is everywhere, in accordance with a thematic plan which provides for extensive actions aimed at the quickest implementation of the achievements of scientific and technical progress. It is possible to mention here the republic conference on the introduction of new equipment into production, the competition for the best suggestion on the saving of energy resources, the seminar on problems of corrosion and much more. In addition, our plan devotes particular attention to the formation of engineering personnel and scientists. The republic seminar, at which the

tasks of young specialists on implementing the decisions of the 27th CPSU Congress and the 28th Estonian CP Congress were discussed, was devoted to this. Other measures on improving the professional skill of younger scientists and engineers are also being implemented within the framework of the thematic plan.

But time dictates newer and newer requirements. Therefore, we are as if are constantly expanding the boundaries of our work, organizing unscheduled meetings, trips, seminars and colloquiums.

For example, fairly recently we organized an exchange of opinions on urgent problems of robotics and flexible production systems among the leading specialists in this field in the cities of Leningrad and Tallinn. This meeting also attracted a large number of workers of industrial enterprises, where the promising technology is already in use or is at the stage of introduction. The plant workers took an active part in the discussions and made specific suggestions. The bond of science with practice took place, as they say, right before our eyes.

The seminar on diffusion welding also aroused much attention of the scientific and technical community. At it an active exchange of opinions took place, heated arguments frequently arose, and original solutions were found. The business-like character of this meeting was rated positively by both the ESNTO and the leadership of the Institute of Electric Welding imeni Ye.O. Paton of the UkSSR Academy of Sciences Kiev), staff members of which were our guests.

Besides the annual thematic plan, a scientific and technical conference on the problems of introducing computers into the educational process at schools, vocational schools and higher educational institutions was also organized. Particular attention was devoted to microcomputers and personal computers. Over 200 mathematics and physics teachers participated in the work of the conference.

The unscheduled meeting of our members with Yu.B. Solovyev, the director of the All-Union Scientific Research Institute of Industrial Design (Moscow), was very successfully.

We are seeking new methods of improving the efficiency of the work of scientific and technical societies, are experimenting, and are attracting enthusiastic people. But at the same time there are also shortcomings in the activity of the republic council.

An extremely unsatisfactory situation has formed in the Scientific and Technical Society of Instrument Making. It would seem that in light of the present-day demands on this important sector of the national economy, the members of the society should have been working actively and constantly exchanging information, but, unfortunately, this is not happening. It is a shame to say that for a number of years not a single plenum of this scientific and technical society has been held and the membership dues been collected.



Recently the ESNT0 Presidium strengthened the leadership of this sectorial society and outlined a number of specific measures which are called up to promote the revival of the Scientific and Technical Society of Instrument Making. We hope that results will not be long in coming.

In addition, we would like to elevate the activities of the republic economic science society to a higher level and to bring it closer to the requirements of intensification. For now an atmosphere of complacency exists here, which is an impermissible luxury today. One needs to see the future, as, for example, is the case in the Scientific and Technical Society of Machine Building, the Scientific and Technical Society imeni Popov and others in the republic.

Successful work is being done here on disseminating among specialists information on the latest advances in foundry work, and engineers and scientists representing many sectors of the national economy are taking courses on the use of advanced computer hardware. The activity of the schools for the use of lubricant coolants, as a result of which this highly efficient method became widespread in the republic, serves as a good example.

Such subdivisions as the houses of engineers, of which there are practically no analogs in the country, have been operating for a long time and successfully in the system of the ESNT0. The absence of staff units is a characteristic feature of them. Everything here is held together by the enthusiasm of the people, who have totally devoted themselves to their favorite cause. This is precisely why the search for nontraditional forms and methods and the prompt reaction to pressing problems are characteristic of the work of the houses of engineers.

There are "houses of engineers" in Tallinn, Tartu, Pyarnu, Rakvere and Vilyandi. Their activity is supervised by presidiums, the membership of which is approved by party organs and the ESNT0. Membership in the presidium is considered an honor--it is no accident that leading party and soviet workers, deputy ministers and general directors of major industrial enterprises work on them. And everything is done on an informal and heartfelt basis. Even though, as is well known, a responsible official does not always have sufficient time, it is always found for the house of engineers. "Hidden reserves" are found, while the result is the introduction of everything that is the very latest and the increase of professional level of one's colleagues and like-minded persons.

The Presidium of the Republic Council of Scientific and Technical Societies coordinates the activity of the houses of engineers and sees that there would be no duplication of the themes and methods of work with other ESNT0 subdivisions.

It needs to be mentioned that our houses of engineers have also become unique mass culture and sports centers. The informal contact of the creative personnel (and engineering, in our opinion, is precisely a creative profession) is mutually enriching, makes it possible to exchange ideas in free form, affords the individual new opportunities, and turns one away from old habits which prevent one from living and working productively. And it is

probably no accident that people come to visit us from other republics in order to better find out about our houses of engineers.

This is natural--today it is necessary to adopt everything positive. Such is the objective requirement of the times. It seems that the associations of the scientific and technical community are called upon to give help as quickly as possible and to intervene more promptly in the processes of intensifying the national economy and in the acceleration of socioeconomic progress. Our goal also lies in this.

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## PLENUM OF ALL-UNION COUNCIL OF SCIENTIFIC, TECHNICAL SOCIETIES

### Ishlinskiy Speech

Moscow TEKHNKA I NAUKA in Russian No 9, Sep 86 pp 2-7

[Speech by Academician A.Yu. Ishlinskiy, chairman of the All-Union Council of Scientific and Technical Societies, at the 7th Plenum of the All-Union Council of Scientific and Technical Societies, in Moscow: "The Acceleration of Scientific and Technical Progress Is a Key Political and Economic Task"; first paragraph is TEKHNKA I NAUKA introduction]

[Text] The 7th VSNTU [All-Union Council of Scientific and Technical Societies] Plenum, "On the Tasks of Scientific and Technical Societies, Which Follow From the Decisions of the 27th CPSU Congress," was held in Moscow in the AUCCTU Palace of Labor. VSNTU Chairman Academician A.Yu. Ishlinskiy delivered the keynote report. This report was discussed by the representatives of the scientific and technical societies who participated in the plenum.

The Policy Report of the CPSU Central Committee to the 27th party congress has become an example of a profound and thorough analysis of the internal and external living conditions of the Soviet people. An impressive, large-scale picture of upcoming transformations in the economic, political and social fields and the ways to achieving them were clearly outlined in it.

Today we are all witnesses to the fact that the spirit established by the party congress is more and more firmly taking root in labor collectives and in the life and activity of the Soviet people. The acceleration of the country's social and economic development is gaining strength, and a great deal is being done and has already been done to eliminate all possible obstacles on the path to building communism.

In defining the tasks of developing scientific and technical progress for the 12th Five-Year Plan and the period 2000, the 27th party congress posed for the organizations of scientific and technical societies [NTU's] a responsible task: "To stimulate the work of scientific and technical societies. From this it follows that the society's organizations must restructure their work more vigorously and must concentrate efforts on involving the public in accomplishing the tasks on modernization and retooling, the orientation of the

creative potential in the main directions of scientific and technical progress, and the organization of the widespread dissemination of advanced production know-how.

We need not only the utmost increase of the efficiency of the public's traditional working methods, but also a bold quest for new forms which will make it possible to utilize the existing potential of the NTO's more fully. Among them we should name public appraisal, to which both the plans for the modernization and retooling of production and the technical level, reliability and quality of the output being produced are subject. The setting up of consultation centers based on the Houses of Technology of NTO's, the holding of "idea trade fairs," the forming of temporary creative collectives of NTO's for filling the orders of enterprises on a cost accounting basis, and other new forms are grouped here. As a rule, these new forms originate not at the upper levels, but in the very depths of our organizations: our primary organizations and our councils.

The urgent need for reorganizing the work of the society stems from the increase of its influence on production in accordance with the decisions of the April (1985) CPSU Central Committee Plenum and the directions of the conference in the CPSU Central Committee on the questions of accelerating scientific and technical progress. Unfortunately, as is well known, a number of ministries and departments have not ensure the fulfillment of the plan of the development of science and technology and the assignments of all-union scientific and technical programs. However, the unsatisfactory state of affairs in a number of sectors has not aroused practical concern among several central boards of the NTO's and has not entail on their part effective measures to help the ministers and departments eliminate the lags.

The VSNTU Presidium and the Central Boards of NTO's, in examining at meetings of the presidiums the progress of the fulfillment of the plan of the development of science and technology, frequently confined themselves to statements of the facts and to general recommendations meant for the councils and local boards of the NTO's, without having backed them with assistance and without having monitored their fulfillment.

In the Resolution of the 27th CPSU Congress on the Central Committee Policy Report it is stated that "as the main lever of the intensification of the national economy the party is advancing the cardinal acceleration of scientific and technical progress, the widespread introduction of equipment of new generations and fundamentally new technologies, which ensure the greatest productivity and efficiency". The congress is placing in the forefront the task of accomplishing the thorough technical modernization of the national economy on the basis of the most advanced achievements of science and technology.

The organizations of the NTO's should take part in implementing sectorial comprehensive programs of the technical development and modernization of production on the basis of state-of-the-art equipment and advanced technology. Engineering support groups of the production brigades should perform practical work in this area. It is necessary to sharply intensify this work and to see

to it that each production brigade and each worker is aware of engineering support. Engineering support work is being filled with a new content.

In response to the party's instructions that each sector and enterprise must have a clear program for the continual updating of production, the primary organizations of the NTO's of the Moskva Furniture Production Association and the Svetogorsk and Syas Pulp and Paper Combines have assumed obligations on the scientific and engineering support of the retooling of production under the motto "Scientific and Engineering Support of the NTO Council for the Retooling of Production".

In modernizing operating works particular attention of the scientific and technical community should be attracted to the solution of the problems of replacing raw materials and components and the development of competitive domestic technologies. This work is already being performed by a number of organizations of NTO's. Thus, by way of giving technical assistance the creative brigade of the NTO of the Voronezh Technological Institute on the basis of a contract on creative cooperation developed and introduced at the plant of electronic devices a technological process for manufacturing stators on the basis of the use of domestic materials. As a result, the quality of the stators is not inferior to imported stators, currency outlays have been reduced, transport expenditures have been sharply reduced, and the smoothness of operation of the enterprise has improved. The economic impact with regard to just the cost of materials came to 45,700 rubles a year.

The machine building industry, which had to be brought up to the highest technical level in the shortest possible time, has been called upon to play a leading role in accelerating scientific and technical progress.

Therefore, the questions of the utmost increase of the productivity, reliability and durability of the equipment being produced and the reduction of its materials-intensiveness should be at the center of attention of the Scientific and Technical Society of the Machine Building Industry. An example of such work is provided by the Belorussian Republic Board of the Machine Building Industry. The coordinating council of chief designers and process engineers of the tractor and agricultural machine building enterprises and organizations, which has been set up under it, in the short time of its activity has helped the Lidselmash Plant in the elaboration of specific measures on increasing the technical level of the potato digger, the Bobruyskfermmash Production Association in increasing the durability of the tools of the manure spreader, and the Gomel Starting Engine Plant in organizing tests of new engines. In early March this council with the enlistment of scientists and chief specialists of other enterprises conducted a public appraisal of the new design of the silage combine at the Gomelselmash Production Association. Here a number of suggestions and recommendations on improving the technical level of the new combine were made.

The most important task is the development and mass production of advanced computers. It was rendered concrete in the statewide program of the creation, the development of the production, and the efficiency of the use of computers and automated systems for the period to 2000.

The questions of raising the level of knowledge of specialists and all workers of the national economy in the use of computer technology is becoming particularly urgent. It should, however, be pointed out that the task posed by the 5th VSNT0 Plenum of setting up at every house of technology of NTO's educational methods centers and classes for the elimination of the computer illiteracy of our specialists and of organizing the education of various age and professional groups of workers is for the present being slowly accomplished.

In the Policy Report of the CPSU Central Committee to the 27th party congress the problem of product quality as our immediate and major reserve was particularly singled out. The questions of radical improvement were repeatedly a discussion topic at our plenums, conferences, meetings and seminars. The VSNT0 together with USSR Gosstandart [State Committee for Standards] has drawn up a series of basic documents aimed at making the scientific and technical community more active. Among them is the Comprehensive Program of the Development and Improvement of Scientific and Technical Propaganda in the Area of Standardization, Metrology, the Increase of Product Quality and Production Efficiency for the Period From 1986 to 1990.

Along with the formulation of all-union programs on increasing reliability and quality, similar programs are being formulated and implemented in the regions. In the Kuybyshev Oblast, for example, where this work is being carried out on the basis of the the appraisal of the technical level of equipment.

One of the primary reserves, which are aimed at increasing labor productivity, is the utmost reduction of manual and difficult physical labor on the basis of the extensive introduction of mechanized and automated production processes, the scientific organization of labor and the certification and rationalization of workplaces. This is an urgent direction in the activity of NTO's. About 2.3 million persons were conditionally freed during the 11th Five-Year Plan due to the implementation of the measures envisaged by the creative obligations of NTO members. Public programs on reducing manual labor have been formulated and implemented by many central boards.

At the same time the achieved pace of the reduction of manual labor can in now way satisfy us.

The consultation and methods centers of NTO's, which operate on the basis of the houses of technology of NTO's and the palaces of culture and technology of trade unions, are called upon to give much assistance to production workers in matters of modernization. The effectiveness of this form of activity of NTO's is corroborated in practice. For example, thanks to the purposeful work of the Methods Center for the Introduction of Means of Mechanization of Manual Labor in the Poltava Oblast (see TEKHNKA I NAUKA, No 8, 1986), in just the past 6 months the labor of over 6,000 persons has been mechanized and made easier, and an economic impact of almost 600,000 rubles has been obtained. Therefore, it is advisable to set up such centers and stations in various directions of scientific and technical progress under the regional councils of NTO's and first of all at the houses of technology of NTO's. The VSNT0 needs to specify the procedure of financing their activity.

I would like to call attention to another reserve for reducing manual labor. It is a matter of the initiative of the collective from the Dnepropetrovsk Combine Plant imeni K.Ye. Voroshilov on carrying out the certification and rationalization of workplaces, which has been approved by the CPSU Central Committee.

An important role in the dissemination of this initiative is being assigned to the All-Union Consultative Center for the Certification and Rationalization of Workplaces and its affiliate in Dnepropetrovsk, which were set up in accordance with a joint decree of USSR Goskomtrud [State Committee for Labor and Social Problems] and the VSNTU. At the present time proposals have been prepared on the establishment of similar centers in Irkutsk, Alma-Ata, Astrakhan and a number of other regions. Precisely these centers are called upon to give procedural and practical help to enterprises and organizations in this important work and to enlist leading scientists and specialists in its performance.

Definite experience has been gained by the societies in realizing the Food Program. Under the VSNTU and a number of the central boards and councils NTO's coordinating councils and groups made up of active members and workers of NTO's, scientists and specialists, who work in the agroindustrial complex, have been established and comprehensive plans of public measures, which are coordinated with the themes of the assignments of the program, are being implemented.

At the same time, as was mentioned in the 27th CPSU Congress, the lag in agriculture is being overcome slowly. A decisive turn is needed in the agrarian sector in order to improve food supply appreciably already during the 12th Five-Year Plan.

In order to achieve the set goals, the scientific and technical community needs to direct its energies at solving the urgent problems connected with the increase of the fertility of lands, the extensive application of intensive technologies, the strengthening of the material and technical base, the improvement of the economic mechanism of the agroindustrial complex, and the reduction of losses of produce of the fields and farms during harvesting, transportation, storage and processing. This is one of the main tasks of agriculture and our agrarian industry.

Our party and the Soviet Government consider the expansion of the production of consumer goods, the improvement of their quality, and the rapid development of all types of services to be an indispensable condition of the increase of the population's standard of living. There is the Comprehensive Program of the development of the production of these goods and the service sphere to 2000. Much attention was developed to this issue at the recently held meeting of the AUCCTU aktiv. It is necessary here to develop the creative initiative of the membership of our societies. It is impossible to tolerate the fact that many organizations of NTO's are displaying inertia and are occupying themselves with minor, special questions.

Now subdivisions, which deal with the questions of consumer goods production, have been established and plans of measures on the implementation the Comprehensive Program have been drafted in all ministries and departments. We need to establish the closest contacts with the ministries and to make the assignments on accelerating scientific and technical progress, which are envisaged by the sectorial plans, the basis of our activity on the promotion of the development of consumer goods production and the service sphere.

The 27th CPSU Congress noted that we have to reorganize the economic mechanism decisively in the interests of accelerating scientific and technical progress in every sector of the economy. All units of the management of the economy are called upon to change their attitude toward the introduction of innovations--such is the demand of the party. And we expect a lot here from our economic science society and the corresponding VSNTO committees. It is necessary to focus their efforts on the development of proposals on the reorganization of the management of the economy so as to make it as receptive as possible to scientific and technical progress, to ensure the interest in this of all units of the national economy and their responsibility for the introduction of the latest scientific and technological achievements and for the attainment of leading levels in the world.

It is necessary to direct particular attention to the creation of conditions for the efficient work of the basic unit of the economic system--the enterprise and association. Experience of such work exists. This is the participation of the community in the development and introduction of standard and procedural materials connected with conducting the economic experiment at the Sumy Machine Building Production Association imeni M. V. Frunze.

The need was pointed out at the 27th congress to set up interbranch scientific technical complexes and centers for the development and large-scale introduction of fundamentally new equipment and technology. These are the MNTK [interbranch scientific technical complex] and the MNTTs [interbranch scientific technical center].

By decision of the GKNT [State Committee for Science and Technology] 16 such complexes have already been established. Among them are the Lightguide Complex--for the rapid development of fiber optics, the Personal Computers Complex--for developing a range of microcomputers, the Biogen Complex, which is oriented toward biotechnology problems, the Rotor Complex--for the development of rotary conveyer lines, and the Laser and Power Metallurgy Complexes. Scientific institutions, design and technological organizations and pilot enterprises of of various sectors are included in the complexes. Their network will be constantly expanded.

The basic method of improving the work efficiency of the organizations of NTO's and increasing their contribution to the development of the national economy is the establishment of state-public organs of the management of scientific and technical progress. The work experience of Georgian NTO's in this area and the experience of a number of oblast councils of NTO's are well known. At the same time the proposals of the VSNTO on the establishment jointly with the State Committee for Science and Technology of state-public



coordinating councils for scientific and technical programs have so far not received support.

Another important reserve is the extensive dissemination of advanced know-how and socialist competition, which should be aimed at the improvement of work quality, saving and thrift, and the achievement of the planned levels in each collective and at every workplace.

The need to encourage the scientific and technical creativity of the working people is indicated in the Basic Directions of USSR Economic and Social Development for 1986-1990 and the Period to 2000. This means that the increase of the creative activity of scientists, specialists and worker-innovators and its orientation towards priority directions in the development of science and technology are one of the most important conditions of the accomplishment of the key political and economic task of accelerating our scientific and technical progress.

Definite work has been done in this direction by the VSNTD and by the councils and boards of societies. However, until recently it was conducted in an unsystematic manner, by the implementation of individual measures mainly by the efforts of staff workers. At the same time a comprehensive approach to this problem is already being implemented on the local level and regional programs of the development of scientific and technical creativity are being formulated. Such a program, for example, has been formulated in Dnepropetrovsk Oblast.

The utilization of cost-accounting elements in the work of the societies will promote in many ways the development of the creative activity of the members of NTO's. An experiment on the establishment of temporary creative brigades of NTO's, which fill the orders of the enterprises on a cost-accounting basis, is now being conducted in Kharkov Oblast. It is still too early to talk about results, but it seems that this might become a promising form of our work.

In the Policy Report of the CPSU Central Committee to the 27th party congress it was emphasized: "Today, comrades, we must concentrate on the practical organization of the matter and on the placement and training of personnel."

As a result of the lack of proper exactingness on the part of the VSNTD Bureau toward passively working executives of the boards and councils of NTO's some of them are incapable or do not want to work in the new way.

The VSNTD Bureau and the central and local boards and councils of NTO's should strive more vigorously for the complete elimination of declarative orders, bureaucratic distortions and speechifying from the practice of the organizing work of every unit of the system of NTO's,

The party considers the adoption of the Comprehensive Program of Scientific and Technical Cooperation of the CEMA Member Countries to 2000 to be a matter of particular importance. A duty of honor of Soviet communists, scientists, engineers and workers, it is stated in the resolution of the congress, is to display an innovative, resourceful approach in the key directions of socialist economic integration.

In pointing out the need to expand the contacts of public organizations of socialist countries, the congress emphasized the increasing significance of mutual enrichment with the thoughts, ideas and experience of the building of socialism.

We need to use more actively and to mutual advantage everything new and advanced, which originates in socialist countries, and to orient international work in every way possible toward the achievement of substantial national economic results. This will make it possible to bring closer the leading levels of scientific and technical progress and the new technological era of the 21st century.

The utmost acceleration of scientific and technical progress is the key political and economic task. The ways and methods of its accomplishment are examined and substantiated thoroughly and comprehensively in the congress documents.

It is important for our scientific and technical societies to find their place in this effort and to devote all their knowledge, efforts and creative energy to the cause of building communism in our country.

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#### Statements of Participants

Moscow TEKHNIKA I NAUKA in Russian No 9, Sep 86 pp 3, 5, 7, 9

[Article: "The Plenum Participants Speak"]

[Text] Academician N.M. Zhavoronkov

A decisive role in the fulfillment of the tasks on accelerating scientific and technical progress belongs to the scientific and technical community. Here it is necessary to unite the efforts of scientists and engineers. Scientists in our country enjoy tremendous popularity and respect. As for engineers, their prestige has declined appreciably in the past decade.

Doctor of Technical Sciences Professor V.I. Meleshko, VSNT0 member and chairman of the Dnepropetrovsk Oblast Council of Scientific and Technical Societies

A person, by taking part in technical creativity, reaps a double benefit: on the one hand, he contributes to the growth of the national income and, on the other, he receives a material reward for efficiency promotion.

Candidate of Technical Sciences V.V. Tkachenko, editor in chief of the journal STANDARTY I KACHESTVO

The radical improvement of product quality is the most important task of the present stage of the socioeconomic development of our country.

Doctor of Technical Sciences L.V. Volchkevich, chairman of the VSNT0 Committee for the Automation and Mechanization of Production

No two robots are alike. It is all a matter of how and where they are manufactured. Having made the pursuit of quantity the cornerstone, we have begun manufacturing not those generations of robots which we need, but those on which are easier to report.

B.I. Borisenko, member of the council of the primary organization of the scientific and technical society and fitter-toolmaker of the MosavtoZIL Production Association

The statutes on the procedure for concluding contracts for the transfer of technical achievements to other organizations are so vague, involved, and labor-consuming that in all years we have not concluded a single such contract. It is time to establish a clear-cut procedure in this matter."

For about 15 years I have been a member of a special-purpose multiple-skill creative brigade which was established in the administration of the Chief Designer for Machining Attachments and Machine Tools at the Motor Vehicle Plant imeni Likhachev. You could say that our brigade was put together haphazardly. The people were joined according to the principle of the unity of creative interests, the unity of ideas. And we dealt with the automation of assembly processes.

The point is that today in the machine building industry, one out of three production workers is an assembler. And at the same time the automation of assembly operations has been made more difficult by the multiplicity of types of connections and by the dimensions of the parts being assembled. The main obstacle for automation lies in the fact that it is necessary to align parts in space with great precision.

Here is a graphic example: the rotor of a hydraulic impeller pump. During assembly a blade has to be inserted into each of its slot. The clearance between the slot and the blade amounts to 2-3 microns. In manual assembly the person seeks out the right position, moving the parts around relative to each other. An automatic device should perform this in automatic assembly. The problem of the relative orientation of the parts is the central problem of automatic assembly. A number of scientists are at work in this area.

Our brigade has taken scientific developments on the methods of vortical orientation as a basis for its work.

The essence of the idea is simple: the part being oriented is moved in a recirculating airstream. Imagine tea leaves in a glass of tea which has been stirred with a spoon. It seems that the tea leaves should move up to the wall of the glass due to the centrifugal force, but, on the contrary, they all come together in the center. And there is no conflict with the law of physics here....

We began our work with an analysis of the assembly operations carried out at the plant. We determined their recurrence, labor-intensiveness and

possibility of automation using known methods. We put the results of the analysis into a card file. Thus, already at the beginning of our work certification was carried out and a working portfolio of problems, which we had to solve, was created.

How do we operate? We hold no brigade meetings. We keep no minutes. The basis of the work is the creative idea. It is important to find a technical idea. But in itself it is not the solution of the problems. It is necessary that the people who have to introduce and use the automatic equipment would believe in it. And since our ideas are often nontraditional and are frequently received with caution, we usually devise a model of the unit. Here the advantage of the fact that our brigade is a multiple-skill one, tells. designers, researchers and workers belong to it.

Various automatic assemblers have been devised in recent years. They have been exhibited at the Exhibition of National Economic Achievements and at international exhibitions in the GDR and Bulgaria.

Dozens of the country's enterprises and planning and scientific organizations are interested in our efforts. Their representatives visit us almost every day. We receive many inquiries by mail. We give as much assistance as we can, we consult and we give advice. But our opportunities are limited. We are ZIL Plant workers and are called upon first of all to accomplish the tasks facing the collective of our plant.

We cannot develop automatic machines for other organizations nor can we travel to them to give practical assistance when devising or introducing automatic machines developed by them using our recommendations. And sometimes they have to cover the same path we have already covered and to "discover America" all over again.

It seems to us that in this direction the NTO, and first of all the Scientific and Technical Society of the Machine Building Industry ought to serve as a foot-bridge which will link us. At one time an assembly operations section was organized under to this scientific and technical society. Meetings, symposiums and conferences were held. The people who were involved in automating assembly operations met regularly and exchanged their experience. But the section then ceased its operation for some reason.

Doctor of Economic Sciences Professor M.M. Makeyenko, member of the VSNT0 Presidium and chairman of the Central Board of the Scientific and Technical Society of Agriculture

We are devoting particular attention to the development of an all-union public review of science and new equipment. This is perhaps our most massive form of involving all the members of the society in solving the scientific and technical problems facing the agroindustrial complex.

The agroindustrial complex of our country has 45 million people. In essence, this is more than a third of all the people employed in the national economy. At the same time only 144,000 workers of scientific and technical institutions service this vast sphere, and of them only 1,100 are doctors of sciences,

which is obviously insufficient. It needs to be said that the return from our scientific personnel is not large. Thus, for example, all of agroindustrial science for the past five-year plan submitted only 12 applications for a discovery. Of them only one was accepted. About what quality, about what appearance at the leading levels can one speak, if we do not provide the necessary scientific reserves?

Moreover, an extremely detailed systematization of results of scientific research, which were defended as dissertations, was made and the results turned out to be just as lamentable. According to the data of the USSR Committee for Inventions and Discoveries, less than 11 percent of the total number of defended dissertations contain any innovations at the level of inventions, while less than half of the doctoral dissertations do. And this means that we are also receiving, in essence, fresh blood of not at all the quality that we need.

This is why the participation of the entire scientific and technical community regardless of its sectorial affiliation in the common cause of accelerating the pace of scientific and technical progress in the agroindustry is especially important for us. As is well known, the Coordinating Council attached to the VSNTO was also formed for this purpose. But for the present, if its work is evaluated from the standpoint of today, this work cannot be recognized as unsatisfactory.

Meanwhile, when we speak of the fact that the upswing of the agricultural sector is a nationwide affair, these are not mere words.

The state of affairs in the agroindustry immediately concerns each of us both directly, since we are the consumers of agroindustrial output, and indirectly, since anything wrong in the agroindustry rests on our shoulders and our budget.

For long years we all said that owing to objective reasons the cost of the output being produced is increasing both in agriculture and in the other production sectors. In recent years we have refined the system of the pricing mechanism and have been trying to regulate it. If prices for industrial items are raised, the purchase prices also go up for agricultural products. But things cannot keep going like this. In particular, costs need to be reduced while producing the output so as to be able to ensure a reduction of state subsidies as well.

A very serious question is the increase of the quality of equipment. The time has come to make in the immediate future a careful appraisal of the machinery being produced for agriculture. How long can we tolerate the fact that every seventh or eighth tractor does not operate during the year? Just by increasing the reliability of agricultural equipment we can save 2 billion rubles.

This is a practical means of decreasing the cost of agricultural output. And if we put an end to the tremendous mismanagement we are still encountering everywhere, it will become obvious that the time has come to work at a qualitatively new level.

Our scientific and technical society has its own special features. We unite 39,000 primary organizations, having a total of 1,400,000 members, that is, a single primary organization has on the average 36 people. It is significantly less than the average level in NTO's. Precisely for this reason the public forms, which allow us to unite in specialists if only at the level of the rayon, are especially important to us. This requires the establishment of a definite material base in the rayon. There were a House of the Specialist and a House of the Agronomist. Now, in essence, there are no such houses. The specialist at the rayon level has nowhere to meet outside the work situation.

V.K. Chub, chairman of the Kharkov Oblast Council of Trade Unions

Many scientists and engineering and technical personnel, in order to earn additional wages, during the time free from the main job work at construction sites and in the service sphere. Why not use their creative potential for its immediate purpose: for the solution of specific technical problems?

Our party's 27th congress puts in the forefront the task of carrying out the thorough technical modernization of the entire national economy on the basis of the latest achievements of science and technology and the reform of the economic mechanism and the system of management. A considerable role in solving this problems is being assigned to public organizations, including trade unions and scientific and technical societies.

But if we take into consideration the scope of the new tasks specified by the party for the 12th Five-Year Plan, we need to admit that the contribution of the organizations of NTO's, particularly of our Kharkov Oblast, to accelerating scientific and technical progress is today obviously inadequate.

The most different forms of stimulating the creative activity of the scientific and technical community, and which exist in the arsenal of NTO's, can no longer satisfy us completely.

In quest of a more effective form of work at the end of last year we organized an intersectorial trade fair of scientific and technical ideas. Its second phase was held in May of this year. Our new initiative can be considered as the next step in this direction.

Immediately following the party congress the oblast trade union council and the oblast council of NTO's appealed to the AUCCTU and the VSNTU to permit an experiment to be conducted in the Kharkov Oblast on establishing temporary creative collectives (VTK's) which work on full cost accounting. Our proposal was thoroughly weighed and argued and therefore received complete support. The experiment was authorized and will last 2 years.

The main task posed for the temporary creative collectives is to solve promptly the urgent scientific, technical, and economic organizational problems which arise in the different national economic sectors.

The results of the holding of our first trade fair served as the basis for establishing the temporary creative collectives. At first glance these

results are not so bad: 7 developments were introduced, about 150 are to be introduced during the 12th Five-Year Plan, and just as many have been accepted by enterprises for introduction.

But of the 244 problematical issues, with which the enterprises turned to scientists and specialists for help at the trade fair, a performer was found for only 7. It turned out to be most difficult of all to enlist sectorial and educational institutes in the fulfillment of large-scale jobs of an intersectorial nature and in accomplishing local engineering problems. The NII's [scientific research institutes], KB's [design bureaus] and planning organizations for various reasons, but most often because of the overload of the backlog, are not undertaking the fulfillment of such unplanned jobs, even though the client enterprises have the necessary assets.

And we asked ourselves this question: Why not use the creative potential of the scientists, engineers and process engineers for its direct purpose, that is, for solving specific technical problems and eliminating the so-called bottlenecks, of which there are more than enough at every enterprise? Here, naturally, the appropriate remuneration of the labor of attracted specialists should also be envisaged. In addition to material interest they should receive complete freedom for the display of creative initiative and the opportunity to realize their ideas and conceptions in metal in a short time and at a high technical level.

At present several temporary creative collectives, which have undertaken, for example, to devise an instrument for monitoring the condition of underground gas pipelines, have already been organized.

I feel I would not be mistaken if I said that both the Trade Fair of Scientific and Technical Ideas and the initiated experiment on cost accounting in the NTO's are of great statewide interest.

We are aware that the task facing us is not one of the easiest and, in accomplishing it, we recall the words spoken by M.S. Gorbachev at the 27th CPSU Congress that only man's talent and initiative and only the vital creativity of the masses can and must ensure success in accelerating the country's socioeconomic development. In this direction we are also continuing our further quest.

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Vladislavlev Election

Moscow TEKHNIIKA I NAUKA in Russian No 9, Sep 86 p 8

[Article: "News Item"]

[Text] The 7th VSNTU Plenum elected Aleksandr Pavlovich Vladislavlev First Deputy Chairman of the All-Union Council of Scientific and Technical Societies.

A.P. Vladislavlev was born in 1936. He is a CPSU member, doctor of technical sciences, and professor. He began his labor activities in 1959 and had a Komsomol job for a number of years. From 1963 to 1974 he worked as a senior instructor, lecturer, professor and prorector for educational work at the Moscow Institute of the Petrochemical and Gas Industry imeni Academician I.M. Gubkin. Since 1974 A.P. Vladislavlev has worked as deputy chairman of the All-Union Society for Knowledge.

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#### Plenum Decree

Moscow TEKHNIKA I NAUKA in Russian No 9, Sep 86 pp 8-9

[Decree of the 7th VSNT0, abridged]

[Text] The decisions of the 27th CPSU Congress and the task set in the Basic Directions of USSR Economic and Social Development for 1986-1990 and the Period to 2000: "to make the work of the scientific and technical societies more active," evoked a new surge of creative energy among all members of scientific and technical societies. The organizations of the NTO's have come forth with a number of valuable initiatives and undertakings aimed at realizing the decisions of the congress.

The primary organizations of the NTO's of the Kiev Machine Tool Building Production Association and Moscow's Frezer Cutting Tool Plant have come forth with the initiative to hold a competition under the motto "A Creative Guarantee for High Quality." A number of organizations of the Scientific and Technical Society of the Paper and Wood Working Industry of Moscow and Leningrad Oblast have adopted obligations on the scientific and engineering support of the modernization and retooling of production. The scientific and technical community of the Chelyabinskiy traktorny zavod imeni V.I. Lenin Production Association has taken it upon itself the engineering support for the innovators' movement "Towards the New Equipment With New Knowledge". The Central Board of the Scientific and Technical Society of Radio Engineering, Electronics and Communications imeni A.S. Popov has joined in the work of the Lightguide Interbranch Scientific Technical Complex. The Dnepropetrovsk Oblast Council of NTO's became the initiator of the formulation of a regional program for the development of the scientific and technical creativity of the working people and young workers.

At the same time the VSNT0 Plenum notes that the reform of the style and methods of work of the NTO's, which was begun following the April (1985) CPSU Central Committee Plenum, is being carried out sluggishly. Many boards and councils of NTO's still lack efficiency, specificity, and purposefulness in their actions, and persistence in creating the proper conditions for the development of the technical creativity of the workers. The recommendations of scientific and technical societies are not being fully implemented. The VSNT0 Presidium and the central boards of NTO's are not displaying the necessary demandingness in these matters. The reform of the organizational structure of the NTO's and their public creative associations in conformity with the present requirements is proceeding slowly.



The VSNT0 Plenum on behalf of the country's scientific and technical societies utterly and completely endorses and accepts for steadfast guidance and fulfillment the decisions of the 27th CPSU Congress. The 7th VSNT0 Plenum RESOLVES [in boldface]:

To regard as the most important task of scientific and technical societies the mobilization of the efforts of the scientific and technical engineering community for the practical implementation of the decisions of the 27th CPSU Congress and the program directives of the congress on accelerating the country's socioeconomic development. The activity of the organizations of NTO's should be aimed at the radical increase of labor productivity and product quality, the saving of all types of resources, the complete use of production capacities, the cardinal acceleration of scientific and technical progress, the achievement of the thorough technical modernization of the national economy on the basis of the latest achievements of science and technology, the achievement of planned levels in each collective and at each workplace, and the further development of the technical creativity of the workers. By all forms of work to promote the successful fulfillment of the assignments of the 12th Five-Year Plan.

The boards and councils of NTO's are to participate actively in the extensive promotion and explanation of the decisions of the congress. To organize at the houses of technology of NTO's, the palaces and houses of culture and technology of trade unions series of lectures, reports and thematic evenings on the materials of the 27th CPSU Congress. Particular attention should be devoted to the in-depth study of all the congress documents at people's universities of technical progress and economic knowledge and public universities (institutes) for the improvement of the skills of specialists.

To ensure the active participation of organizations NTO's in implementing scientific, technical and socioeconomic programs.

To promote in every possible way the expansion of the practice of setting up temporary creative collectives of scientists and production workers for the elaboration of urgent technical problems.

To focus the attention of organizations and members of NTO's on solving the problems of: the development of the machine building complex; new materials and technologies; the fuel and energy complex; the development of the agroindustrial complex and the implementation of the Food Program; the development of consumer goods production and the services sphere; development of transportation and communications; capital construction; environmental protection; the efficient use of natural resources, and the improvement of the management of the national economy.

To expand the practice of conducting public appraisals of plans of the retooling and modernization of operating enterprises, new machinery, structures and technological processes with the formulation of practical recommendations on increasing the technical level of the equipment being produced and on reducing its metal content and power-output ratio; to strive

for the removal of obsolete designs of machines, equipment and items from production.

To devote particular attention to the holding of goal-oriented competitions and reviews on the accomplishment of the tasks of improving the quality and technical level and on reducing the metal content of produced output. To recommend that the central boards of NTO's institute bonuses for the organizations of NTO's, which actively contribute to the solution of these problems.

The central, republic, kray and oblast boards and councils of NTO's are to develop and perfect the competition of scientists and technical and engineering personnel in accordance with individual and collective creative plans and to focus the efforts of those competing on the acceleration of the introduction of the achievements of scientific and technical progress, the improvement of the techniques and technology of the organization of labor and production, the reduction of the labor- and materials-output ratios, the increase of the scale and pace of the reduction of manual, low-skilled and difficult labor, and the creation of safe and healthy working conditions.

To develop a network of consultation centers, particularly for the problems of the reduction of manual labor and the use of microprocessor hardware, the efficient use of raw materials and waste, and the increase of the reliability of equipment and product quality.

The central, republic, kray and oblast boards and councils of NTO's are to stimulate the work on the development and increase of the efficiency of scientific and technical creativity, particularly of young people, and on the involvement in creative activity of various categories of workers with the most complete use for this purpose of the Houses of Technology of NTO's, the Palaces and Houses of Culture and Technology of trade unions, and technical offices.

To display persistence with the maximum use by planning, economic and scientific organizations of the proposals and recommendations of the scientific and technical community, to increase the efficiency of public monitoring of the introduction of inventions and efficiency proposals, and to use more fully various forms of stimulation of the participants in scientific and technical creativity.

To create in every organization an atmosphere of creative efficiency, to increase the accountability for the assurance of the unity of word and deed, and to strive consistently for the planned goals.

The VSNTU Presidium and the central and local boards and councils of NTO's are to wage more vigorously the struggle against paper work and formalism.

To increase significantly the demandingness on the personnel of NTO's, to introduce the regular certification of responsible officials of the staffs of NTO's, to improve the training of the personnel and aktiv, having directed particular attention to the creation of and the increase of the level of work with the reserve of personnel.

The VSNT0 Plenum expressed confidence that the scientific and technical community will devote its efforts, knowledge and experience to the successful execution of the historic decisions of the 27th CPSU Congress and the assignments of the 12th Five-Year Plan and will make its contribution to the practical embodiment of the outlined program of the building of communism.

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CSO 1814/75

## TRAINING AND EDUCATION

### IMPROVEMENT OF TRAINING, USE OF SPECIALISTS

Moscow TEKHNIIKA I NAUKA in Russian No 9, Sep 86 pp 14-17

[Article by Candidate of Technical Sciences V. Kuzmin, deputy chief of the Consolidate Department of Science and Technology of the RSFSR State Planning Committee, under the rubric "Scientific and Technical Progress: Experience, Problems, Research": "The Specialist of Today and Tomorrow"; first two paragraphs are TEKHNIIKA I NAUKA introduction]

[Text] In the party decisions on the reform of higher and secondary specialized education in the country it is emphasized that the skills and competence of personnel and their great civic responsibility determine in large part the scale and pace of scientific and technical progress and the intensification of the national economy.

The success of such reform depends first of all on the improvement of the planning and organization of the training and use of specialists in the national economy. What exactly needs to be improved here? The article of Candidate of Technical Sciences V. Kuzmin, deputy chief of the Consolidated Department of Science and Technology of the RSFSR State Planning Committee, is devoted to this.

#### "Who's Who" at His Workplace?

Any "major" or "minor" question of intensification, no matter where it comes up, in principle cannot be settled without using the present-day scientific knowledge and scientifically generalized advanced know-how, the basic bearers of which are specialists. The scale of their training, especially in new directions of science and technology, is being substantially expanded in our country. Whereas the absolute increase of the number of personnel with a higher and secondary specialized education during the decade of 1951-1960 came to 5.5 million, during 1971-1980 it came to 11.8 million, including respectively 2.1 million and 5.2 million with a higher education. At present not less than 35 million specialists are working here, they make up over a fourth of all employed people.

Thus, we have no shortage of skilled personnel. Why is it then, in spite of this, that during the past three five-year plans the national economy did not achieve those indicators of efficiency, which were envisaged by the plans? We

should seek one of the reasons in the organization of the entire matter of the training, retraining, and increase of the skills of personnel and their use in industry, at scientific and planning organizations, and in management organs.

First of all it should be emphasized that we have first-class theoretical and applied scientists, designers and process engineers, science and production organizers, and the necessary staffs of highly-skilled workers. No, there is, perhaps, no problem connected, for example, with the increase of efficiency and quality, the efficient solution to which would not be found in some one of the labor collectives. We have scientific, engineering and technical organizational "innovations" and advanced know-how in sufficient quantity. However, the scale of their dissemination is often so modest that as a whole they do not decisively effect the technical and technological level, the pace of acceleration, and the efficiency of one sector or another and the entire national economy.

As an example we can cite the experience which was approved by the CPSU Central Committee, of the collective of the Dnepropetrovsk Combine Plant, which without substantial capital investments in a short time increased the production volume by twofold, increased the output with the Emblem of Quality to 82.5 percent, reduced its production cost, and almost doubled labor productivity. These successes are directly connected with the activity of the plant managers and specialists on improving all stages and levels of management. But why are the very same indicators considerably lower at the Rostselmash and Taganrog Combine Plants, which belong to the same sector? Why has the experience of the related enterprise not been used here? Apparently, one of the reasons is the unfortunate selection of personnel.

In 1982 a commission of the RSFSR State Planning Committee, the RSFSR State Committee for Labor and Social Problems, and the RSFSR Ministry of Higher and Secondary Specialized Education studied (with the participation of the author of the article) the composition of the personnel at these enterprises and was convinced that many specialists at both combine plants were not prepared to solve the problems of scientific and technical progress at the level of their colleagues in Dnepropetrovsk.

Thus, at Rostselmash specialists in diesel locomotive building, land management, navigation, journalism, biochemistry, history...were found in the departments of the chief designer, process engineer, metallurgist, stamp operator and other engineering positions. At the Taganrog plant specialists in the working of mineral deposits, mining machinery and complexes, the chemical technology of glass and silicates, the technology of processing grain, the technology of petroleum and gas, forest engineering, and the construction of hydroelectric power plants, waterways, and ports were often used in the positions of foremen, chiefs of shifts and shops, and their deputies. A specialist in the technology of the production of milk and dairy worked as a flaw detector operation, a music teacher and a specialist in preschool psychology worked as sociologists.

The same kind of study, which was made at enterprises in Leningrad, in Sverdlovsk and Chita oblasts, in the Chuvash ASSR, and at construction organizations of Moscow, showed that in many national economic sectors the

lack of conformity of the type of vocational training of managers and specialists to the positions held by them had achieved an appreciable scale.

Observe the Rules!

How in practice is the lack of conformity of the level and type of education of a portion of the managers and specialists to the requirements of the positions held by them to be eliminated? What possibilities do we have here?

First of all, uncompromisingness is needed here. "Everyone," M.S. Gorbachev said, "should know well not only what it is necessary to do, but also how to do this..." and "...we cannot put the interests of one person above the interests of the entire society." (Footnote 1) (M.S. Gorbachev, "Nactoychivo dvigatsya vpered" [Move Persistently Forward], Moscow, Politizdat, 1985, pp 26-27) The task of the management organs of all units of the national economy and the system of higher and secondary specialized education is to organize systematic advanced training of the personnel who do not have the necessary specialty. It is necessary to stimulate the activity of the organs of the State Committee for Labor and Social Problems, which should keep track of the observance of the corresponding requirements, increase the responsibility of certification commissions for the objectivity of the evaluations of the competency of personnel, and introduce the reporting of enterprises and organizations on the indicators of the conformity of personnel to the positions they occupy. Moreover, if the need arises to hire specialists who do not have the proper training, it should be taken as a rule to make this dependent on the obtaining of the necessary training within a given period, regarding it as a trial period, and to pay for the advanced training of such personnel from the special development fund of the enterprise.

Cut Back, But..."Just Not From Us"!

More specialists now work in the national economy than there are positions for them, and this is a generally recognized fact. Here not even the socially necessary standards, but the manning tables, which were distorted upward, proved to be excessive. This is why the decision adopted at the beginning of the 11th Five-Year Plan on reducing the scale of training for specialists with a higher education in the day form of education was entirely valid. All concerned management organs at the center and locally supported it. Nevertheless it has in practice not been possible to implement it, since departmental and local interests and the interests of individual VUZ's, chairs, and professors in many cases turned out to be more effective than the state's interests.

When the draft assignments on the reduction of admissions, as well as the reform of the structure of the training of personnel in individual specialties were reported to the VUZ's, practically all their representatives concentrated their efforts on proving that "this is impossible here" and in so doing obtained the support of the local organs, enterprises, ministries, individual scientists and even the press. The central planning organs, which defend state interests, turned out not to have the necessary support in this case. As a result, even though it was possible to make substantial changes in the

structure of the training of specialists, far from everything resulted in the the reduction of the admission to VUZ's.

The main reason for these difficulties was the fact that the step, which was correct as a whole, was poorly analyzed in the area of it, which concerned VUZ's. The financial organs automatically accompanied the stipulated reduction of admission and, accordingly, the student bodies of daytime departments with assignments on the reduction of the teaching staff, using as an argument for such a step the complexity of the demographic situation, the difficulties of providing the national economy with manpower, and the need to economize on budgetary allocations. Under close scrutiny it was impossible to recognize any of these arguments in this situation as serious.

First, we had a shortage not of manpower in general, but of workers. Naturally, the instructors freed by the reduction did not go to work as machine tool operators, but get a scientific job at scientific research institutes, design bureaus, enterprises, and organizations where there was no particular need for them. It would have been preferable to keep them busy with scientific research and economic contractual jobs at VUZ's rather than reduce the scientific potential which has accumulated at VUZ's.

Second, the decision, which existed to that time, on the reduction of the staff ratio at VUZ's (the number of students per instructor), which was established 30 years ago at the level, which has formed at the end of 1955 and had not been revised once since then, was not taken into account. (And this in spite of the radical change in the demands on the quality of the training of specialists during the scientific and technical revolution, which involves not last of all the individualization of instruction and, hence, the increase of the number of instructors and the reduction of the staff ratio.)

Third, the staff ratio is not a better indicator for determining the need for instructors. For a complete "set" of academic disciplines, volumes and types of lessons, and teachers of different skills is objectively necessary even if in the given specialty it is necessary to train only one specialist. It is also necessary to regard precisely these factors as basic and primary for the determination of the need for instructors.

And all the same they were not taken into consideration. The reduction of admission and, accordingly, the number of students, which leads to the automatic reduction of instructors, inevitably evoked their reaction in response in the form of a "struggle for existence" and for the retention of instructor's units, chairs, and faculties. This struggle is distinguished by a great diversity of techniques and arguments, which were far from always "academic."

#### How Many Specialists Are Needed?

It should be emphasized that the question of reducing the scale of the training of specialists with leave from work remains acute and pressing, and the dragging out of its solution is fraught with serious negative consequences. Given the preservation in the future of the established scale of the training of specialists, their number in the national economy in 2000

will come to not less than 50 million, including more than 20 million with a higher education. Is it necessary to have such a number of specialists and will there be found for such an "army" of highly skilled people the necessary number of workplaces (positions), where each of them should be guaranteed satisfaction with the nature and content of labor, as provided for by constitutional law? We believe that for the finding of well-reasoned answers to these questions it is necessary to make a thorough scientific investigation, with verification in practice, of the social and economic aspects of the problem. Here it is necessary to take into consideration the effect of the factors connected with the scientific and technical revolution and social and economic progress, with which we will be faced in the immediate and distant future.

The problem of the determination of the general and additional need for specialists is the key problem in the planning of their training, assignment, and use. It was raised back in first years of Soviet power and became an object of planning when drafting the 1st Five-Year Plan. Since then this problem has been a constant object of scientific research, the results of which invariably evoked the heightened interest of the planning organs, which strove to increase the scientific and practical soundness of the indicators of state plans. It should be mentioned that everything which has actually been scientifically established and generally accepted was included in the existing procedural instructions on the drafting of plans. However, the state of the standard base of the training of specialists is now rated as unsatisfactory.

In recent years over 500 scientists and specialists have delivered reports on this theme at just two all-union symposia (Tbilisi in 1980 and Vilnius in 1983) and three republic (RSFSR) applied science conferences (Leningrad in 1978, Irkutsk in 1980 and Saransk in 1985). However, no reliable method for determining the need for personnel, which is based on standards which have been substantiated as socially necessary, has so far been devised. Many methods and approaches to the description of the problem are being proposed, but justified is this "methodological pluralism"? It can, after all, attest to both the wealth and the methodological poverty of scientific developments. That is why it is useful to evaluate the degree of scientific validity and practicality of the existing methods.

#### Sensible Ideas and Fantasies

The efficiency of this or that method of determining the need for specialists should be evaluated by at least two criteria. First, by the scientific cognitive potential, which has been incorporated in it for solving the planning and management problems of training and using personnel. Second, by its suitability for all levels of planning and management with the use of unified indicators, which are applicable when drawing up plans of the admission of students to higher and secondary educational institutions and the assignment of their graduates.

The saturation method is presently the most firmly established one when determining the need for specialists. Its essence is that by the statistical processing data (for a certain prior period) on the number of specialists among the people employed in a sector and the national economy there is



singled out the saturation coefficient  $K_H$ , which is expressed by the simple formula:  $K = q_c/q_3 \cdot 100$ , where  $q_c$  is the number of specialists;  $q_3$  is the number of employed people; 1000 means that the coefficient is defined per 1,000 employed people.

The method has a number of weaknesses. First, the saturation coefficient makes no economic sense, it defines among the employed only the portion of people, who have graduated from a VUZ or tekhnikum, without answering the question: What specialties should they have? Second, for the future the saturation coefficient can be determined only by extrapolation, by carrying over to the future not only the positive, but also the negative aspects of the formed situation. Third, in analyzing the formed situation enterprises with a different actual provision with specialists can have an identical saturation coefficient. Moreover, the number of employed needs to be defined as a standard number, therefore, it is not a very correct technique to calculate the saturation coefficient by operations with two uncertainties ( $q_c$  and  $q_3$ ).

It is natural to suppose that the saturation method, which does not make it possible to determine the occupational skills structure of personnel, does not give an answer to the question: With whom should some services or others of enterprises and management organs be manned? Consequently, it is impossible on the basis of this method to carry out scientific planning which corresponds to the level of present-day knowledge.

In recent years mathematical economic methods of determining the need for specialists (factor models, probability methods, and so forth) have become widespread.

The method based on establishing the functional dependences of the number of specialists on the production factors influencing it bears a sensible idea. But the practical implementation of such a model is possible only if these factors have been correctly selected and the degree (proportion) of influence of each of them, which is expressed by some coefficient, has been established. Usually such a model in uncomplicated mathematical form takes the form of a regression equation:

$Y = a_1x_1 + a_2x_2 + \dots + a_nx_n$ , or an equation in exponential form:  $y = a_0x_1^{\kappa} \cdot x_2^{\alpha} \dots x_n^{\beta}$ , where  $x_1, x_2 \dots x_n$  are the influencing factors;  $a_1, a_2 \dots a_n$  are the coupling coefficients;  $a_0$  is the normalization factor;  $\kappa, \alpha, \beta$  are the coupling coefficients in exponential form.

The capital-labor ratio, the power-worker ratio, the number of employed people, the profitability, and so on are taken as the factors which presumably influence the number of specialists.

In the regression equation the coupling coefficients  $a_1, a_2 \dots a_n$  are established in exactly the same fashion as the correlation coefficients, consequently, they do not have dimensionality. It turns out that we add up rubles, kilowatts, and so on and assert that the result is expressed by the number of "people."

rubles, kilowatts, and so on and assert that the result is expressed by the number of "people."

If we closely examine the equation in exponential form, we can see its senselessness, since no one will be able to explain what the capital, the power-worker ratio, and so on, which have been raised to a power which differs from 1 and have also been multiplied among themselves, express. Apparently, those who use this equation assume that it yields the number of specialists in "people". But this, of course, is nothing more than a fantasy.

The influencing factors, being expressed in rubles, kilowatts, and so forth, can in no way be norm-forming, because no manager or specialist deals directly with them, he performs totally different operations and functions.

Thus, the factor method could be of benefit only if a precise quantitative connection between the number of specialists and the norm-forming factor has been established.

Two Times Two Is...Five!

Serious scientific methods errors are committed by many researchers who attempt to use probability methods to determine the need for specialists. For some reason it is not thought to be obligatory to conduct a test of a statistical series for stability, the variables are not broken down into similar statistical populations, and when identifying the correlation connections a test for the falsity of the correlation is not conducted. It is also possible to list a number of other similar errors.

In short, the possibility of deriving knowledge from the lack of knowledge of the subject of research by calculating the probabilities or frequencies of events has been groundlessly attributed to the statistical and probability methods. Meanwhile, in the problem we are examining the main thing is to reveal the essential connections between the causes (factors) and the consequences (numbers and structure of the staff of specialists). But such a statement of the problem should always be extrastatistical.

The use of mathematical methods in economics requires particular caution and conscientiousness. Otherwise, results, which either do not have a specific content or give grounds for incorrect interpretation, are obtained.

Who is not acquainted with the "mathematical jokes" of school children, who spread among their contemporaries the proof that  $2 \times 2 = 5$ ? It is clear to anyone who can count to 5 that the result is erroneous, but not everyone can find the place in the logic of the proof where this error originated. One can only wonder at and regret the fact that the Collegium of the USSR Ministry of Higher and Secondary Specialized Education by its decision of 13 August 1981 approved and obligated ministries to use the Procedural Instructions on the Elaboration of Standards of the Saturation of Sectors of the National Economy With Specialists, in which practically all operations with statistical data, including methods for deriving regression equations and correlation connections, contain the errors which were examined and evaluated above.

When selecting a method for determining the need for specialists it would be useful to bear in mind that at any level the indicators obtained by means of it should be plan indicators and provision should be made for the possibility of their "settling" down at the level of those national economic units (organizational structures) where positions (workplaces) which are to be filled actually exist.

It is obvious that when designing enterprises, setting up organizations and organs of management, and placing personnel it is necessary to express such a need formally by a document, in which a specialist having a specific educational level, a occupation, skills, work experience, and length of service is matched with each position. This is also the manning table. But it will be effective if the list of positions and their number have actually been determined on scientific grounds as the socially necessary ones under the specific (current and long-range) conditions of the functioning of the production unit or management organ. It seems that one should "curse" not the manning table as a formalizing document, but the principles which were incorporated during its elaboration by specific authors.

Therefore, it is interesting to examine how and why manning tables, which distort the standard need for specialists, appear.

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CSO: 1814/75

## AUTOMATION AND INFORMATION POLICY

### MOSCOW AUTOMATED CONTROL SYSTEM

Moscow TEKHNIKA I NAUKA in Russian No 9, Sep 86 pp 18-20

[Article by S.Ye. Serdyuk, manager of a scientific research department of the Main Scientific Research Center of Planning and Control Systems of the Scientific Production Association of Moskva Automated Control System, under the rubric "Scientific and Technical Progress: Experience, Problems, Research": "The Automated Control System of the Capital"; first two paragraphs are TEKHNIKA I NAUKA introduction]

[Text] According to UN data, by the year 2000 half of the entire world population will be living in cities. But already today municipal services are a very complex multipurpose industry which has its own laws and trends of development.

S.Ye. Serdyuk, manager of a scientific research department of the Main Scientific Research Center of Planning and Management Systems of the Scientific Production Association of Moskva Automated Control System, tells how they are approaching the solution of management problems in the capital of our homeland, Moscow, one of the world's largest cities.

#### Goals, Tasks, Prospects

The modern large city with a population of over 1 million is a polystructural formation which has general and specific economic management, sociocultural, and natural characteristics. Such cities are the most important territorial units in the country's state, economic and social system. As V. I. Lenin expressed it, precisely cities are the main motive force of progress. They unite into a unified whole the facilities of the production and social infrastructure, which ensure its integrated and, what is most important, systematic development.

The need to improve the territorial aspect of planning and management was indicated in the Policy Report of the CPSU Central Committee to the 27th party forum. The greatest opportunities for implementing these directives exist precisely in large cities, where it is necessary to organize and develop in every way possible integrated systems of territorial and sectorial management on the basis of the achievements of scientific and technical progress.

The integrated planned management of a city's development is called upon to ensure the complete unity of actions of all local executive bodies and enterprises of the various sectors and the optimal distribution of material, manpower and financial resources.

Here the sectorial and territorial tasks of economic and social development should be accomplished only in interconnection, with allowance made for the common character of the ultimate goal--the increase of the economic and social standard of living of citydwellers.

Moscow is a unique multisectorial territorial production complex which is in constant dynamic development. With every passing year its population grows, its material and technical base expands, its scientific and technical potential grows, and the volumes of freight and passenger traffic increase. A single new thing entails tens, hundreds of changes in many areas of production and social activity.

The improvement of the organizational system of city planning and management is being accomplished by means of automated control systems for four components: the city-planning base (industrial sectors); the population and manpower resources; the city service complex (sectors of municipal services); the environment.

When establishing the unified Moscow-wide planning and management system, first, a systems approach is necessary. The socialist city acts as a large open socioeconomic system consisting of a tremendous number of interrelated elements. Second, it is necessary to take into account the external limitations, resource and time limitations, which will perforce influence the city subsystems. Here two basic directions are examined: the overall improvement of socioeconomic planning and management and the automation of these processes.

With respect to the nature of the social division of labor in the economy of a large city it is possible to distinguish three groups of sectors: physical production, services, and mixed sectors. Here each of them is a component of the corresponding national economic sector.

Practically all types of industry are represented in Moscow's production sphere. The nonproduction sectors are formed of organs of state management, scientific institutions, health care organizations, housing and municipal service enterprises, cultural and art facilities, and so forth. Communication, transportation, trade, public dining and other enterprises are grouped with the mixed sectors. Here a large portion of the enterprises, institutions and organizations of the nonproduction sphere are united by the concept of "municipal services" and are closely connected when operating with all the facilities of the city-planning base.

When we speak of the scientific, integrated determination of possible ways to develop a city, we have in mind long-range planning, which is aimed at solving the most important national economic and social problems by the intensification of the city's economy. And this problem should also be solved in our country at a high modern level, which makes it possible to take into

consideration the vast diversity of factors interacting in the most complex "urban organism". It is clear that this can only be done by using the potentials of automated control systems.

And in the matter of the efficient management of the development of the capital a large role is being assigned to the Complex of the Moskva Automated Control System.

#### Why Integrated Territorial-Sectorial Automated Control Systems Are Being Established

Integrated systems of the management of the economic and social development of major cities are becoming a vivid feature of today. They should ensure the greatest objectivity, reliability and timeliness of the technical and economic analysis of the state and trends of development of a city's economy during the preplanning period; the comprehensive, scientific substantiation of upcoming goals and tasks and the substantiation of the means of their accomplishment.

The statewide system of the collection, processing and transmission of information for accounting, planning and management, which operates on the basis of an automated control system which increases the possibilities of the direct comparison of economic values and the consideration of various aspects of operational and social activity, plays an important part for ensuring the efficient combination of the sectorial and territorial division of labor in the development of a unified national economic complex.

The integrated planned management of the development of the city should completely unite the actions of all enterprises and sectors, which are located on the territory of the city, and local organs in the work of the identification and most efficient use of technical and economic, manpower and financial resources and all the accumulated national wealth.

The management of the city should ensure "vertically" and "horizontally" the fulfillment of the most important general economic tasks, including the modernization of the operating production system, the consolidation of the material and technical basis of the infrastructure, the rapid process of development of the sectors, which create the technical base for the automation of production and management, the development of the fuel and energy complex and the system of municipal service mains and transport lines, and others. Among these problems the problems of social development, which are associated with the increase of the well-being of the people and growth of education and health care, will hold a more and more important place.

The established municipal services require consistent improvement of the organizational structures of the management of the production and social processes, which function on the basis of the processing and the establishment of the necessary and reliable amounts of various types of information. The setting up and development of systems of the territorial-sectorial management of the comprehensive development of cities also serves this. None of the present methods of planning and economic stimulation will produce the desired result, if they are adapted to obsolete organizational structures of management. Today we need to increase the demands on the balance of the

sectorial and territorial economy in case of dynamic shifts in the structure of production and its and technical level.

In the area of the organizational structures of management it is necessary to balance the strongly developed sectorial system of management of the economy and management with respect to intersectorial complexes and territorial development. The development of the sectorial forms and methods of management should be carried out in inseparable connection with the assurance of the overall social and economic development of the territory. Here the development of economic integration processes in the regions requires the further intensification of the efforts on the improvement of territorial management.

The management of large cities is acquiring particular urgency in connection with the need for the efficient, complete use of all types of resources and manpower and the development of the social infrastructure. Under these conditions the narrow interest of sectorial ministries serves as a serious obstacle in the matter of ensuring the complete use of resources and capacities. As a rule, the sectorial ministries and departments try to develop their works in cities, on the basis of narrowly understood economic advantage, without taking into account the availability of manpower resources and without displaying proper concern for the development of the social infrastructure, housing, cultural, and personal service construction, and the entire set of conditions of the life and activity of people.

The necessary centralization and pooling of the assets, which are allocated to the sectors for the comprehensive development of cities, became urgent long ago, but are being carried out inadequately.

The development of a large city proceeds in accordance with objective social and economic laws, but the organs of sectorial management do not bear in mind and do not take into account the effect of these laws.

#### The Moskva Automated Control System Is a Concept of Development

The automation of the planning and management of the development of the city and municipal services is aimed at the accomplishment of two basic tasks: first, to provide the corresponding subject of management with an integral systems idea of the object of management, no matter how large and complex it is (here we are talking about Moscow, a city with a population of almost 10 million!), and, second, on this basis to carry out the optimal and effective planning of the activity of both the object and the subject of management.

When establishing the complex of the Moskva Automated Control System a unified conception of the improvement of the management of the city and municipal services, on the basis of consistently improved organizational structures in municipal services and collectively used computer resources, was formulated and approved. Thus, the boldest, most promising ideas and solutions on setting up integrated territorial-sectorial systems, on the basis of which the integration, coordination and interaction of all participants in the city's social and economic processes have been put in the forefront, are as if being accumulated in the complex of the Moskva Automated Control System.

The complex of the Moskva Automated Control System is being established on the basis of:

- a unified methodology of sectorial and territorial management;
- an automated technology of the integrated management of the development of cities;
- a distributed municipal computer network;
- advanced standard and applied software.

What "duties" are being assigned to the automated system?

The complex of the Moskva Automated Control System is the most important means and tool of the improvement of the comprehensive planning and management of the capital's social and economic development. This is the main problem, the solution of which should be optimal from every standpoint. On the basis of timely, objective, and complete information the organs of management of the enormous city, various sectors of the national economy, rayons, enterprises, and institutions will ensure the dynamic and balanced vital activity of the city "organism." The needs of Muscovites will be satisfied to the greatest possible degree, while comfort level will be raised by the acceleration of the pace of scientific and technical progress, the quickest introduction of its achievements in all spheres of urban survival, and the intensification of the city's economy.

In the future the complex of the Moskva Automated Control System should connect together over 40 sectorial systems of main administrations, administrations and departments of the Moscow City Soviet Executive Committee, 11 intersectorial automated systems, 33 rayon, 15 citywide, as well as a number of special and specialized automated control systems, hundreds of plant technical management automation systems, and over 1,000 automated systems of associations, enterprises and organizations of the Moscow City Soviet Executive Committee.

In order for all the elements and components of the complex of the Moskva Automated Control system to operate together and efficiently, systemwide support facilities, which include a complex of distributed automated sectorial and territorial data banks; general and standard software; an automated system of the management of classifiers and a network of collective-use computer centers, which are linked by the unified city data transmission network, are being established.

Procedural support and organizational and legal norms are also being established.

The software of the Moskva Automated Control System makes it possible to construct the appropriate economic models for solving problems of the management of both individual objects of municipal services and their entire



set, encompassing all the phases: from long-range forecasting to sectorial decisions.

The programs of the complex are an operating information retrieval system with great possibilities for using centralized and distributed territorial data banks.

If we speak about the programs and hardware of the Moskva Automated Control System, we must note that it is designed for solving both global (city-wide) tasks and the problems of individual main administrations, administrations and enterprises on the basis of the extensive use of smaller computers. Here local control computer complexes are linked with the central general-purpose computers. In addition, a distributed computer network of the city is being set up.

Here, of course, very briefly, are the basic fundamental principle regarding the development of the complex of the Moskva Automated Control System.

As to specific completed and introduced developments within the complex at the beginning of the 12th Five-Year Plan period, this is the theme of the next discussion.

From the Editorial Board

The questions of the development of automated control systems of large cities, in our opinion, are very urgent. Urbanization under the conditions of the socialist method of management should in principle preclude the haphazard expansion of megalopolises; the inefficient use of material resources; incompetent management decisions, which entail an influx of manpower from the outside, which, in turn, requires vast amounts of living space, services, transport, and so on. The times require the radical and rapid reform of all facets of public and economic activity. Therefore, we will continue to publish materials both about the Moskva Automated Control System and about other promising developments, which are aimed at improving the socioeconomic standard of living of the Soviet people on the basis of the effective utilization of the achievements of scientific and technical progress.

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## INDUSTRIAL AND COMMERCIAL APPLICATION

### DEVELOPMENT OF METHODS OF INCREASING PETROLEUM PRODUCTION

Moscow TEKHNIKA I NAUKA in Russian No 9, Sep 86 pp 12-13

[Article by Doctor of Technical Sciences O. Kuznetsov, USSR State Prize Winner and Director of the All-Union Scientific Research Institute of Nuclear Geophysics and Geochemistry of the USSR Ministry of Geology, Doctor of Technical Sciences G. Vakhitov, director of the All-Union Scientific Research and Planning Institute of the Petroleum Refining and Petrochemical Industry of the Ministry of the Petroleum Industry, and Doctor of Technical Sciences E. Simkin, chief of a sector of the All-Union Scientific Research and Planning Institute of the Petroleum Refining and Petrochemical Industry, under the rubric "Scientific and Technical Progress: Experience, Problems, Research": "A Thousandfold More Rapidly"; capitalized passages published in boldface; first three paragraphs are TEKHNIKA I NAUKA introduction]

[Text] Today, only up to 50 percent of geological oil reserves are extracted from a well during recovery.

"It has become clear that the time of the 'golden gushers', the time, if it can be said so, of the easy oil, is coming to an end", said M.S. Gorbachev at the conference of the party and economic aktiv of Tyumen and Tomsk oblasts. "We need to change over to its forced recovery...to intensify the oil fields by using both new equipment and new technology for increasing the the yield of formations."

Soviet scientists are presently occupied with solving this most important problem. Doctor of Technical Sciences O. Kuznetsov, USSR State Prize winner and director of the All-Union Scientific Research Institute of Nuclear Geophysics and Geochemistry of the USSR Ministry of Geology, Doctor of Technical Sciences G. Vakhitov, director of the All-Union Scientific Research and Planning Institute of the Petroleum Refining and Petrochemical Industry of the Ministry of the Petroleum Industry, and Doctor of Technical Sciences E. Simkin, chief of a sector of the same institute, tell in this article about one of the unusual developments.

According to specialists' calculations, the world will need as much petroleum during this decade as the human race has needed during the past 100 years. In our times petroleum often determines the rhythm of life, and with every passing day more and more of it is needed. And along with the increase of the

need for this valuable raw material, its reserves are being depleted. More and more often petroleum must be brought up from extremely great depths, and this is so even in hard to reach regions. The "Baku version", when the petroleum, as they say, is found right beneath one's feet, just a few meters from the surface, almost inside the city limits--has been replaced by the "Tyumen version": the impassable swamps of Western Siberia, wells 3-4 kilometers and more deep.

What lies behind the works "to recover petroleum"? First of all, to search for its field, with the aid of seismic prospecting at the exploratory stage to determine promising regions and areas and specific petroliferous structures.

Prospecting and, if a field is found, exploratory wells, with the deepening of which they constantly take and study a core sample, as well as perform all types of logging, are drilled at the sight where rocks containing petroleum are found.

At the prospecting stage the sites of the occurrence of petroleum reservoirs and their geometry have already studied vertically. They determine precisely the lithological nature of the reservoir; the structure of the collector (mineral reservoir)--porous, fractured or cavernous; the degree of hollowness of the reservoir is quantitatively evaluated; and, finally, the fluid filler of the reservoir (petroleum, gas) and its quantity are correctly designated. At this future technology of working the deposit is substantiated and development wells are drilled.

And only then does actual recovery begin. And again the geophysicists indefatigably monitor the technical state of the wells and the passage of petroleum and gas in the space between them.

In general a well is expensive, very expensive. The desire to recover from the deposit, as they say, the last drop is perfectly understandable. Alas, in fact everything seems different.

The natural pressure within the formation, although high (up to 15 million pascal), forces only 2-10 percent of all the petroleum in the pool into the development well. As a result, the petroleum needs "help" to move toward the steel pipe of the well. But how is this done?

The choice of methods, unfortunately, is small. There are, for example, thermal methods: steam or hot water is delivered to the formation. The oil yield increases somewhat.

The in-situ combustion method is more effective. An amount of air is "injected" into the formation, and the petroleum is ignited. Compressors keep forcing air through the well, and it forces the combustion front through the formation. A hot zone, which pushes the petroleum toward the development well, emerged in front: 70 percent of the mineral are conveyed to the surface.

However, each of these methods can be used in only a narrow range of field geological conditions and, what is the main thing, requires a five- to tenfold increase or else more of the number of wells. Every percent increase in the formation yield becomes almost "golden", and this is why thermal methods are used only when working high-viscosity, heavy petroleums.

A more effective method for today is flooding. Water, which bursts into the formation with tremendous speed, is pumped in through injection wells. Here the stream of water pulsates, showering the collector with impact after impact, expanding and forcing open the pores, fractures and crevices, driving the petroleum out and forcing it, like a piston, to the bottoms of the development wells.

However, in spite of the fact that the scale of application of the flooding of formations is being expanded from year to year and the method is being improved all the time (for example, various chemical reagents, which increase appreciably the degree of the "washing out" of petroleum, are being added to the water), the maximum extraction of the mineral does not exceed 50 percent. Then only water with traces of petroleum come up to the surface. The rest remains in the formation in the form of dispersed drops and so forth.

An increase in the total, on an all-union scale, petroleum withdrawal by just 1 percent would give additional millions of tons to the national economy, which would solve many problems of the efficient use of natural resources.

Therefore, a search for fundamentally new methods of increasing petroleum recovery. One of them will now be spoken about.

The basic idea of the method and the mathematical substantiation and testing on models of formations were advanced and implemented by specialists of the All-Union Scientific Research and Planning Institute of the Petroleum Refining and Petrochemical Industry of the Ministry of the Petroleum Industry, the All-Union Scientific Research Institute of Nuclear Geophysics and Geochemistry of the USSR Ministry of Geology, and the Institute of Earth Physics of the USSR Academy of Sciences.

A half a century ago it was noticed that when a heavily-laden train passed near a well the petroleum flow rate increased appreciably. At that time oil fields were not yet flooded, and the seismoacoustic action of the train exerted pressure on the "pure" petroleum formation.

By that time geophysicists had already assessed the benefits of acoustics: elastic waves, in contrast to electromagnetic waves, travel great distances, even in conducting media, among which are rocks. And to this day acoustic methods are basic in mineral exploration and prospecting.

At the same time the extensive use of vibration technology began in construction, metallurgy and other fields. However, decades were needed before the "collaboration" of the two technologies at a depth of several kilometers under special conditions of work in the extremely limited clearances of a well, at high pressures and temperatures was organized.

The principle of operation is as follows. A vibrator (or set of vibrators) is placed on the ground surface directly above a depleted flooded formation (or around it). The acoustic radiator is lowered into the well to the depth of occurrence of the formation (Figure 1 [figure not reproduced]).

The vibrator is a heavy-duty platform with a mechanism vibrating a heavy load. Here something like a small earthquake is created. But whereas during the natural phenomenon the seismic energy is directed from the bottom up, here it is travels from the top down.

The energy conveyed to the flooded zone of the formation by the vibrators acts on it, creating conditions for the separation of the gas which is dissolved in the oil-water mixture. The gas passes into the free phase in the form of finely-dispersed bubbles, which are uniformly dispersed through the entire formation.

The disturbance produces nonlinear forces which bring the entire complex system of the flooded formation into motion. There arises a standing wave--the result of the interference of two traveling waves, the amplitudes of which are equal, but the directions of propagation are mutually opposed. Here the gas bubbles migrated from the antinodes to the nodes of the standing water (to an equilibrium position).

The tiny gas bubbles which have appeared in the flooded zone of the formation begin to "hunt" the drops of petroleum. Having drawn near, they "cling" closely to them. The energetics of this process is simple: it is much easier for a gas bubble to remove water molecules from the nonwetttable--very "slippery"--surface of a drop of petroleum than to force these molecules apart in the practically incompressible aqueous layer. Having adhered to the drop of petroleum, the bubble begins to penetrate it, gradually becoming covered with petroleum. It becomes a unique flying sphere which greatly increases the force that pushes the droplet upward--to the surface of the water layer of the formation.

Moreover, gas bubbles in an intense seismic field, as has already been mentioned, concentrate in the nodes of the standing wave. And since the petroleum is now bonded with the bubbles, it moves along with them in the necessary direction. In practice this means that by controlling the direction and frequency of the field induced by seismoacoustic action, the drops of petroleum can be moved purposefully.

Calculations show that if we proceed from the need for the accumulation of petroleum in the center of a 20-meter formation, the time of the complete separation of the petroleum and water does not exceed 50 days (it has been calculated that natural separation takes 80-100 years). Thus, the accumulation of petroleum in a seismic field occurs almost A THOUSANDFOLD MORE RAPIDLY than gravitational separation. In other words, the road has been opened to the practically COMPLETE, and not HALF, extraction of geological reserves of oil petroleum from a formation.

Vibration works in the space near wells: by means of it the area of the formation near the well bottom is rid of deposits of inorganic salts and paraffin, which impede the flow of petroleum into the well.

And another very important observation. So that an impression of this effect as an ideally organized and extremely inexpensive mechanism would not be formed, it is necessary to talk a little about the energy expenditures on the accumulation of petroleum.

Energy is needed for the seismoacoustic action. In addition, the propagation of elastic vibrations with no losses of energy occurs only in an ideal medium, but in a real medium it--half of it at best--is expended overcoming the extremely imposing friction of the rocks.

As a consequence, the energy expenditures here, undoubtedly, are considerable: the vibrators (the larger they are, the better the energy is concentrated) should operate around the clock for 2 months. Nevertheless, the energy expedience of the operation is present: the corresponding experiments convincingly showed that the expenditures of seismic energy on a formation amount to approximately 0.3 percent of the energy equivalent of the petroleum contained in it. Simply speaking, in order for the process of seismoacoustic action on a flooded formation to be justified with respect to energy, it would suffice to achieve an increase in the petroleum yield of only 0.3 percent!

The impact of the increase of the petroleum yield of a formation, which we have told about here, is just beginning to move from the laboratory walls to the real conditions of the fields. But we are certain that this by no means trivial method should become a fundamentally new means of sharply increasing the petroleum yield. The development of the corresponding technologies with its use will bring back to life completely flooded, abandoned fields, having turned them into "new" petroleum reservoirs, and will give the country much more of the most valuable mineral.

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## NEW MEMBRANE TECHNOLOGIES, MATERIALS DESCRIBED

Moscow TEKHNKA MOLODEZHI in Russian No 8, 1986 pp 4-6

[Article by Zorislav Polyakov, USSR deputy minister of chemical industries: "We Are Fulfilling the Decisions of the Party -- An Era of membrane Technologies -- To Find a Place for Membranes"]

[Text] How can water be distilled? There are several methods. For example, one can evaporate it and then condense the vapor. It can also be frozen. The most popular method is to pass it through a polymer membrane. How much energy is expended on each of these processes?

To distill a cubic meter of water, the first method requires 230.4 MJ of energy, 28.4 is needed by the second and 13.3 for the third.

This is only one of scores of examples that show the basic advantage of membrane processes, their high degree of energy efficiency. That is why today, specialists from the most varied areas of industry have become so interested in this technology.

The extensive use of membrane technologies to solve important tasks in the chemical, petrochemical, paper and many other industries has been made possible above all by successes in the creation of membranes, most frequently polymer membranes, with a series of unique properties.

The assortment of membrane technologies is extremely varied. They can be based on liquid substances as well as on metals, glass, ceramics and polymer films, pipes and fibers.

The basis for all membrane processes is separation, the selective transfer through the membrane of one or several components of a system with passage blocked to the remainder.

Quantitatively, this phenomenon is characterized by terms such as selectivity: the higher the selectivity to certain compounds, the more effective the separation. Selectivity depends on an entire series of factors such as the nature of the interaction between the separated substances, the membrane

material, the size of the membrane pores, the way in which the process is realized, etc.

For example, it is known that hydrogen in small quantities can be dissolved in palladium or palladium alloys. This unique property was used to create membranes that selectively remove hydrogen from various gaseous mixtures. Such separating elements are already used on an industrial scale.

Another example is porous polymer membranes (of given pore sizes) that make possible efficient separation of proteins and enzymes of different molecular masses. In this case, selectivity is determined by the size of the pores and the organic molecules.

One of the most promising membrane materials now is polymer ion-exchange membranes that can separate charged ion-particles. These are usually produced in the form of fine films of high-molecular compounds containing positively- or negatively-charged groups. The latter are chemically bound to a polymer molecule and are known as fixed ions. The positively-charged groups can be mobile under certain conditions such as in an electrical field. The ionic permeability of mobile ions allows them to be replaced with other types of ions. An example of the use of ion-exchange membranes is electrochemical cells in which the motive force is an electrical field. This is the principle behind the membrane technology used to produce chlorine and caustics.

There does not nor cannot exist a membrane that can be used for all processes alike. Every process requires its own type of membrane with its own special properties. For example, the chief property of membranes used in the food industry is their ability to withstand repeated repeated purification to destroy "clogging" and harmful microorganisms. Therefore, gas-separating membranes should above all be elastic and durable. The basic criteria in the selection of a membrane for electrolysis of table salt is its resistance to a corrosive environment.

In connection with this, it has become necessary to create the most varied types of membrane materials and structures for separation apparatus, without which it would be impossible to successfully develop new technology.

A comprehensive approach must be taken toward the problem of membranes. That is why the Membrane Interindustrial Science-Technology Complex [MNTK] was created in our country. This organization should be responsible for conducting the entire cycle of work from the establishment of theoretical foundations for membrane technology to the manufacture and introduction of various new membranes to industry.

MNTK now includes science-research institutes conducting fundamental research and developing membrane materials and the technologies for their manufacture and use, the Ministry of Chemical Industries Science and Production Association [NPO Minkhimproma] along with its organizations involved in the manufacture of separating components and other establishments of various



ministries. Their task is the creation of fully automated separating apparatus and equipment.

Finally, MNTK will also include groups responsible for the quicker introduction to industry of innovations and for training specialists to work with membranes.

In the meantime, what is being done? A factory orders an institute to develop and make a membrane for a certain process. However, once the product reaches the factory, no one really knows how to use it. How is such a problem resolved?

For that reason, there is much interest in the experiences of the All-Union Synthetic Resins Science Research Institute [VNIISS] in Vladimir. They have created mobile membrane equipment which can be assembled at a given plant by special crews and then demonstrated over a period of a few weeks not only to encourage the potential client to buy it but also to show him how such an installation is serviced. Therefore VNIISS has introduced tubular membrane elements for removing lubricating oil to the Vladimir Oblast Regional Agricultural Equipment Association [Raysekhkhovtekhnikha].

As we know, when machine parts are prepared for painting, their surfaces are generously covered with oil which is then removed using surface-active substances containing specific additives. Following this process, the solvent saturated with these surface-active substances is usually discarded and the lubricant is therefore used only once. This is not only unprofitable but also increases the level of water pollution.

VNIISS suggested passing the oily solution through the tubular membrane elements "broken in" by the outside crew within two weeks of their delivery to Raysekhkhovtekhnikha. The results exceeded all expectations. The oil was completely separated from the solvents and could be re-used a number of times. At the present time, many such installations are operating at machine-building factories throughout the country.

On becoming acquainted with the work of VNIISS, other establishments found their own uses for the tubular membranes. At one plant in Vladimir Oblast, these membranes were used to separate compounds containing oil that could be separated and used to produce fibers. At the Tasma Kray Production Association [KPO] in Kazan, these membranes are used to separate many valuable components in the regeneration of motion-picture film materials. At the Vinnitsa Oil Works, these membranes remove glycerine from fatty acids and at the Vyshnevolotsk Enzyme Works, various types of cellular organisms are gathered in these membranes. The list of membrane uses is even longer.

In my opinion, today, now that membrane technology is stronger, it is necessary to begin eliminating "membrane illiteracy" among specialists in various fields and to determine just what areas of industry can use membranes.

An important role in resolving this problem is taken by the Membrane MNTK. We are now working on a structure for this complex. It is possible that it will be broken down into centers for the introduction of various membrane methods.

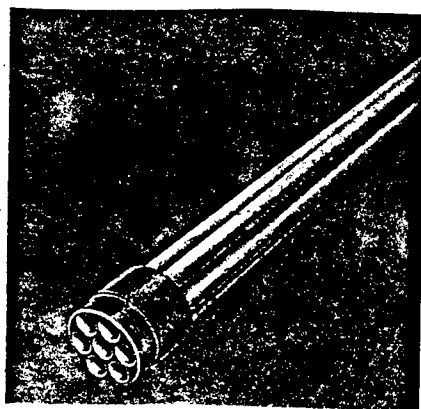
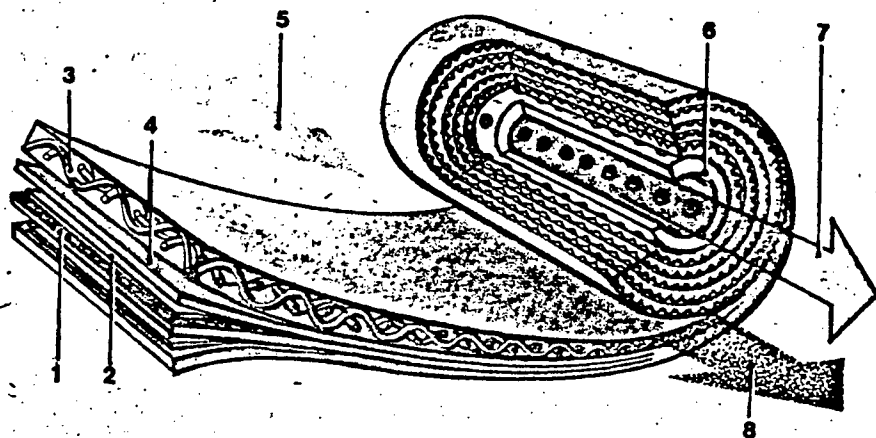
Depending on the type of membrane being used, there are several methods of membrane separation (as described in V. Stanitsyn's article "How Membranes Work"). These methods include microfiltration, ultrafiltration and reverse osmosis. Work on improving these methods should be concentrated where they have long been used. The center for introduction of the first method may be KPO TASMA and for the second, VNIISS while the center for introduction of gas separation by reverse osmosis would be the Kriogenmash Science-Production Association in Moscow Oblast. These centers will also contain training divisions which will hopefully serve to rouse the interest of potential clients and demonstrate that membrane technology is quite useful because of its simplicity and reliability, ease of automation, low operating costs and high profitability. All of this will help to more quickly introduce such technology.

At the present time, specialists are not only working on improving old technologies and creating new ones but also on achieving the best combination of several different methods and each specialist is concentrating his attention on specific components. The sequential use of microfiltration, ultrafiltration, reverse osmosis and then "finishing" with ionic-exchange membranes might be a very effective means of purifying water in the electronics industry. Water treated in such a manner would no longer contain any organic, mineral nor bacterial impurities.

There is still one more problem that has emerged in the process of enhancing membrane selectivity and that is the creation of a second generation of membranes set on backing emulsions. If the membrane is applied to a carrier, its structure is better ordered and durability is strengthened. With its universal properties, polysulfonamide polymer can be used in processes of reverse osmosis and ultrafiltration. If it is applied to an emulsion of non-tissue lavsan [synthetic fiber produced by the Laboratory for Macromolecular Synthetic Fibers], its strength is increased several times. This promising development is presently being intensely studied.

As we see, this technology still has many problems and we hope that young scientists and industrial specialists will take an active part in work to resolve them because it is the work of young specialists that will largely determine the future success of this technology.

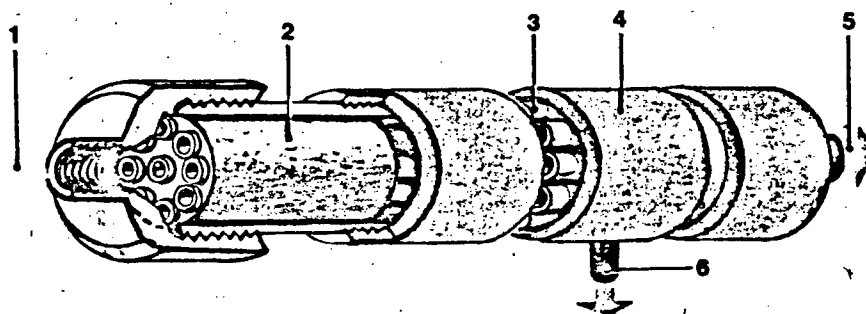
removed from the separator. Key: 1) membrane; 2) draining device; 3) turbulator; 4) adhesive compound; 5) flow of solution being separated; 6) drain tube; 7) filtrate flow; 8) concentrate flow.



Here it is, the tubular element!

Tubular separating elements, within which there is a membrane (most often it is made of fluorinated, aromatic polymers, as well as cellulose acetates), were developed at the Vladimir Institute of Synthetic Resins for carrying out ultrafiltration processes. The tubular elements are arranged within the apparatus in the form of blocks, the ends of which are sealed with a sealing compound. The medium being separated, for example, a solution containing lubricating oil, is fed into the tube where the membrane removes the oil from

an aqueous solution of surfactants. Key: 1) medium being separated; 2) sealing compound; 3) separating element; 4) body of the apparatus; 5) filtrate; 6) concentrate. The advantage of tubular elements lies in the fact that they can be used to separate fluids containing suspended particles, as well as fluids which have not undergone careful preliminary purification.



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## INTERNATIONAL S&T RELATIONS

### USSR-CSSR COOPERATION IN PRODUCTION OF HYDRAULIC DRIVES

Moscow PRAVDA in Russian 21 Jul 86 p 4

[Article by PRAVDA special correspondent L. Chausov (Kirovograd): "The Key Is the Addition of Forces. The Scientific and Technical Revolution: About the Addresses of Cooperation"]

[Text] Just recently only two firms--in the FRG and in the United States--had a monopoly on such production. No one else was producing a positive-displacement hydraulic drive. In the meantime it is difficult to imagine a qualitatively new generation of many machines without it. This is construction, road, and agricultural machinery.... The need for such hydraulic drives was quite keenly felt in the socialist countries, beginning with the fundamental retooling of the countryside, when obsolete machines had to be replaced by new ones--much more powerful, high-output, reliable ones.

At that time a questions also arose: Should the units be purchased in the West? The manufacturing firms were asking an exorbitant price. So we decided to get by on our own. Czechoslovakia and the Soviet Union among the CEMA member countries undertook to specialize in the important product.

Today the machine builders of the two fraternal countries are jointly manufacturing even more hydrostatic transmissions of a number of type sizes than are being made in the capitalist world. And they are not in the least worse in quality. In short, the monopoly of the western firms has become a thing of the past.

The collectives of the Czechoslovak ZTS Association, which is in Dubnice-nad-Vazem, and Gidrosila Plant in Kirovograd, approached the difficult scientific and technical problem. They worked intensely and looked over a large number of versions, until the first batch of hydraulic drives say the light of day.

"We got a real tough one," S. Fedenyuk, chief of the enterprise's Foreign External Economic Relations, recalls how they began the common cause. "Judge for yourself. The tolerance and roughness are not more than a micrometer. Like a mirror, but even smoother. If you take such a part off the conveyor, it heats up slight in your hand, and you will not put it in its place at once during assembly: a person's body temperature is enough for the volume to

grow.... You can imagine the inflexibility of the demands on technological discipline!"

Generalizing the prehistory of the cooperation that has already been established with the partners from the CSSR, Kirovograd people assert that they achieved success due to international mutual assistance. In this connection, Gidrosila Director and delegate to the 27th party congress G. Bugreyev relates how cordially emissaries from the Soviet plant are always greeted on Czechoslovak soil, how generously experience is shared, and how frankly problems are pointed out.

I am interested in whether there were irregularities during the first contacts between the two enterprises.

"To say that the establishment of cooperation went smoothly would mean to err from the truth. Naturally, not everything went well at first. Thus, at first the mutual deliveries were not balanced. But, in overcoming the difficulties and 'getting set,' the partners persistently strove for their common goal: finally to begin direct production cooperation and to venture direct ties," responds the director. Then, after reflecting, he continues: "And then it was time for each to concentrate on specific units. Moreover, to ensure the proper quality, so as not to be ashamed to appear on the international market."

Specimens of the mechanisms can be seen in the plant administrative offices. Orange-painted, they are lined up in a row. Above them is a map of the world. The export threads from Kirovograd have extended to 42 states. Over 90 percent of that export is to the CEMA countries. The strongest ties are naturally with partners from the CSSR: during the current five-year plan the volume of mutual deliveries by hydraulic drives alone will reach tens of millions of rubles.

After becoming acquainted with the Gidrosila Plant, one can understand why these direct contacts at the plant have become a matter of worker honor. They are not limited here to conventional familiarization trips: they say, we made a trip abroad, talked about this and that, gave out souvenirs.... The Kirovograd people approach direct contacts in earnest. They are striving to develop them on a solid foundation of industrial cooperation. This is the large-scale exchange blanks, component units, and parts with the ZTS.

Pyramids of units destined for shipment abroad gleam in the assembly shop. They still have to undergo the captious check of the quality inspector--a representative of the Ministry of Foreign Trade, after which the product can be dispatched for export.

Now there is a uniformity of the approach to difficult technological questions, the workers at both enterprises have achieved complete standardization of the model. This makes it possible to use capacities more profitably, to develop cooperation in depth and breadth, and in the future to develop a common design that should surpass today's best world models.

The workers at Gidrosila believe that life itself convinces them that the time has come to organize a joint planning and design bureau, which is called upon to solve more efficiently the long-range problems of cooperation. It could quite possibly be based at Dubnice-nad-Vazem, where, by the way, a scientific research institute for applied hydraulics is located. Scientists and specialists from both countries, who will be consolidated into temporary international collectives, now already have something to rack their brains over. This is the selection of priority ranges of machines, questions of creating common capacities, and close inspection of what was previously done, in order not to take life easy and not to mark time, but to rapidly develop models of new generations.

The bureau, they explained to me, will become the prologue to the establishment of a Soviet-Czechoslovak scientific production association.

The chronicles of interaction also include moments that can, perhaps, be called dramatic. Thus, a difficult situation developed at Dubnice-nad-Vazem in the spring. A shortage of domestically produced cylinder blocks arose. The unit cannot be assembled without them, but clients are waiting. It was then that ZTS General Director Milan Potfaj appealed to the Kirovograd people on behalf of his collective. The friends requested that we send an additional 1,000 such items. At Gidrosila they responded immediately and did the work efficiently and with a high quality.

In turn, when the Kirovograd people urgently needed servo-cylinder parts and other semifinished items, their partners did not leave them unanswered. The essential items quickly arrived from Czechoslovakia. There are many such examples of mutual assistance.

One cannot, however, remain silent about one thing. In addition to the objective reasons that hinder the development of direct ties, there are, unfortunately, obstacles of a subjective nature. I was told about this with concern at the plant.

It turned out that the incident with the extraordinary delivery had, like a coin, a reverse side. The Gidrosila workers fulfilled their promise quickly and efficiently, but when it came to shipping the products to the clients, the foreign trade representative at the plant...refused to accept the items for export. His reason was that these items were not included into the current delivery schedule, while their production was not previously specified. Formally this step was justified. But the point is that an emergency situation not envisaged by the instructions had arisen. It is apparent that the time has come to revise the instructions if they interfere with a vital matter, and to give freedom to socialist enterprise. And perhaps the powers of foreign trade representatives should be increased? In any case, quite a number of questions have accumulated there, and, the plants workers said, they would like to get clear, unequivocal answers to them.

The units, which they so awaited at ZTS, were finally sent off to Czechoslovakia. But first many days of going "from instance to instance," long telephone explanations, and correspondence with the foreign trade departments...were necessary.

Perhaps, there also belongs to the same category of artificial barriers, complain the Gidrosila specialists, the fact of how tedious it is at times to make a business trip to their partners: months are spent just on putting the documents in order. But production often requires the immediate settlement of various "burning" questions, figuratively speaking, right at the machine tool.

The plant workers also bear a grudge against some of their parts suppliers. Take, for example, the Volgograd Plant of Tractor Parts and Standard Designs, from which springs and bolts, which are essential for the assembly of devices, come. The quality of the small, but important parts, alas, often leaves much to be desired. "We have for the present a grievance with the Volgograd people," declare the people I talked to at the Gidrosila Plant. I was also told that the servo-cylinder castings that are supplied by the Dushanbe Tadzhikgidroagregat Plant are beneath all criticism: 20-30 percent are flawed. Moreover, a "dirty trick" in metal blanks cannot be detected right away. Frequently, it is already at the polishing stage. This means that equipment runs idle and a tremendous amount of time and human labor is wasted. Just what is the problem there?

"No matter how many times we appealed to the suppliers, they dismiss the matter. They say the quality of the iron is such. We looked into the matter: it turns out that the billets were being cast from a completely different brand than the one called for by the specifications. We pointed this out, but the suppliers were in no hurry to correct the situation," shop foreman S. Korenev explains the essence of the conflict.

As they say, no comment is necessary.

Gidrosila was recently awarded the Red Banner of the Czechoslovak Trade Unions. It now stands in the plant museum. "For the exemplary fulfillment of export assignments for the CSSR" is embroidered on it in gold.

Well, then, the award was well deserved: the Kirovograd people were winners of an international socialist competition in honor of the 27th CPSU Congress and the 17th CPCZ Congress. Its active participants from Dubnice-nad-Vazem are well known at Gidrosila.

Conscientious work. Here is the guarantee for the strengthening of good relations. The addition of forces has been yielding an impact.

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## REGIONAL ISSUES

### INEFFICIENCY OF RSFSR SECTORIAL SCIENCE

Moscow SOVETSKAYA ROSSIYA in Russian 6 Sep 86 p 1

[Article by B. Dolmatov, editor of SOVETSKAYA ROSSIYA for the Science and Educational Institutions Department, under the rubric "The Opinion of the Editor": "Departmental Failures"; capitalized passages printed in boldface]

[Text] Recently the USSR Council of Ministers adopted a decision to eliminate two sectorial institutes: The GiproNII Mash of the Ministry of the Machine Tool and Tool Building Industry and the All-Union Scientific Research, Planning, and Design Institute for Integrated Production Lines of the Ministry of Chemical and Petroleum Machine Building, having declared their work uncreative and completely fruitless. This is a serious object-lesson to all inactive scientific organizations and a warning: if you do not increase your efficiency, be ready for the harshest measures! There are approximately 900,000 workers employed in sectorial NII's [scientific research institutes], design bureaus, and laboratories, 80 percent of all resources allocated for the development of science and technology come here. And society is vitally interested in seeing that these billions are spent sensibly. But can we be content with the fact that the impact from scientific and technical measures annually amounts to only 3 percent of the growth in labor productivity? Of course, not! But the reckoning should be not in fractions, but in orders of magnitude. And the fact that the country is losing millions and millions of rubles where it should find them is largely the fault of NII failures. Futility and inefficiency are an exceptionally alarming symptom of the disease of sectorial science, and this was discussed with concern at the last party congress.

The existence of some sectorial institutes can be revealed from the payrolls. The sign "NII" is there, but there is nothing behind it. And I would like to understand why the associates working at them--not at all mediocrities and far from loafers--do their job in an indifferent, formal, and uninspired way?

A few days ago I visited an affiliate of the All-Union Scientific Research Institute of the Peat Industry of the RSFSR Ministry of the Peat Industry. This subdivision, which is hidden in the basements of Moscow buildings, lives peacefully and inconspicuously. I am interested in finding out from Director A. Lazarev and Party Buro Secretary V. Rusakov how the scientists have enriched their sector.

"We have had quite a few accomplishments," the executives assured me. "For example, we ascertained the main reason for the lag of peat enterprises--it is the incomplete utilization of weather conditions...."

This statistical job took the affiliate almost 3 years: they collected data on clear and overcast days and other figures, processed the data, and printed pamphlets, but no scientific thought was required there. Well, all right, the scientists did do some applied work and killed a lot of time, but is the result, perhaps, worthwhile? Alas, the subsector both could not have worked worse and continues to upset the plans.

The primary task of the affiliate is the solution of economic problems. But at the institution there is not an economics specialist, so that the associates are trying their hand in other directions: dust collection, the reconditioning of worn out parts.... Such work has been performed for a long time in a number of places, and the Moscow scientists often merely have to drag along close behind. The result is that the institution's yield is several kopecks for each ruble spent. Is it really worth prolonging the existence of this kind of subdivision? That is the question.

"We are at the very edge of technical and scientific progress," Lazarev confidently retorts. "There is no where closer...."

One unwittingly gets hooked on the idea: no, they did not get up to the level of thought that is required by the times. They have become accustomed to work here without a yield, and have become so accustomed to it that they do not even notice the futility of their work. And are they the only ones?

The Ural Scientific Research Institute of Water Resources of the RSFSR Ministry of Land Reclamation and Water Resources, the Kalinin Affiliate of the All-Union Scientific Research Institute of the Peat Industry, the VNIikompozit of the Ministry of the Chemical Industry, the republic TsNIIbyt.... Their return is pitiful, but they live in clover. One can cite multiple examples, and the questions are natural: Why will these NII's not become bankrupt? Why do the ministries tolerate these wasteful expenditures in especially large amounts.

Let us begin with the fact that science in our country, in reality, is carried on the state budget, and this money for the ministry is, so to speak, special, you cannot transfer it from item to item. That is why there is also no interest in its efficient spending. On the contrary, the main administrations and scientific and technical administrations themselves thrust upon the NII's a myriad of current assignments and immediate themes and load them down with paper work. For example, over 90 percent of the developments of the Leningrad Affiliate of the Scientific Research Institute of Motor Transport are aimed at the formulation of standard procedural documents, instructions, and recommendations.... In fact enormous offices and laboratories subsisting on small scientific odd jobs are being established in the sectors at the expense of budget allocations that are intended for intensive research. This, too, creates fertile soil for the sprouting of failures.

Many sectorial institutes have lost sight of the front line and have slipped into the periphery of the problems: local developments, paper reference manuals, copying of foreign models.... Of course, the scientific trimming of some elements or others of operating technologies and machinery is also needed. But when too large an army of scientists is drawn to such work, this cannot but alarm us.

Individuals made and make science. And if some institute cannot boast of an abundance of ideas and lives on the outskirts of the main directions, it would not be out of place to take a look at what kind of specialists are working there. And then and there it turns out that, for example, there is only one candidate of sciences and no doctors of sciences at all for the entire All-Union Scientific Research Institute of the Leather Goods Industry of the USSR Ministry of Light Industry (the developments of the institute belong to the past). People, who have little in common with the job with which they are dealing, work at several scientific institutions of the State Agroindustrial Committee. Such associates are not capable of understanding the vital problems of their own sectors, hence the conclusion: it is optional to deal with this. And so they do what is in their capability: minor improvements, 1-day themes, empty instructions....

But one-half of the associates of the scientific institutions in our republic do not have a specialized education. What can we expect from them, what kind of discoveries? And is it any wonder that many studies are carried out at a low scientific level and that primitive and obsolete decisions are incorporated in designs? Last year only 9 percent of the innovations introduced in RSFSR departments contained inventions. The rest--91 percent--are traditional or obsolete scientific and technical solutions.

It would seem that the question of the competence of some personnel and even the closing down of NII's and design bureaus that have compromised themselves should arise. Nothing of the kind. Almost all of the workers (99.6 percent) at scientific institutions, who were recently certified, have been recognized as suitable for the held position, and, incidentally almost half were recommended for promotions.

It seems that a certain type of scientist, who shuns research themes, is incapable of being daring and taking risks, but with a developed management aptitude is satisfied with trivial results, has developed. A person of such a mold will not create a revolutionary technology and advanced models of machinery--he will forever be "improving" that which is old. He also breaks others of the habit of thinking, seeking, and assuming responsibility.... This kind of psychology, as we see, stands in the way of progress and, penetrating NII's and design bureaus, dooms them to futility. Precisely at such institutes corporative groups and groupings of hacks, who stubbornly champion the old, customary directions, even if their lack of promise and unsoundness are obvious, also arise. The time has come to oppose this detrimental psychology and to drive from the walls of science somnolence, apathy, and provincialism--qualities that are intolerable at any time, and particularly now!

The responsibility for sectorial science has been assigned to ministries. Their executives are obliged to set long-range goals and tasks for the scientific subdivisions and to regularly check and evaluate their activity. But in many departments the strategy of entire scientific directions has been transferred to the institutes. The researchers themselves plan for themselves themes, which in practice do not undergo qualified discussion and appraisal, and pack their briefcases with orders, taking into account not so much the demands of the future as the tastes of their colleagues and the immediate gain.

This kind of situation suits both parties. Both the NII's, which do not bear responsibility for putting out obsolete products in the sector. And the ministries, since they are responsible for the quantity of production and prefer to avoid complex tasks that are called upon to provide for the future. The reason for the vitality of unsound institutes also lies in this abnormal situation, when departmental science is independent and isolated from basic production.

What is to be done?

It is most correct to see the solution in the elaboration of such a set of organizational, economic, and moral measures, which would place departments under conditions when they NEED SCIENCE. It is then that sectorial science will actually become sectorial.

The experience gained at the Sumy Production Association and AvtoVAZ suggests a reliable way of increasing the efficiency of Scientific organizations--their changeover to complete cost accounting. It is a question of sectorial science itself earning its own stature. Given such a system the weak and unproductive NII's will simply wither away....

At the 27th party congress the acceleration of scientific and technical progress was declared a program issue of our life. Economics, science, and technology must be raised to a new level. And not a single NII nor a single scientific collective has the right to stand aloof from the reform.

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CSO: 1814/54

## CONFERENCES AND EXPOSITIONS

### MEETING OF IUPAP EXECUTIVE COMMITTEE IN TBILISI

Tbilisi ZARYA VOSTOKA in Russian 25 Sep 86

[Article (GRUZINFORM): "International Meeting of Physicists"]

[Text] The session of the executive committee of the International Union of Pure and Applied Physics (IUPAP) opened in Tbilisi on September 24. Participating in its work were leaders of this, one of the world's oldest and prestigious international organizations that unites national committees of physicists, academies of sciences, and other major scientific organizations from more than 40 countries of the world.

A GRUZINFORM correspondent asked IUPAP Vice President and one of the leading Soviet physicists, Lenin Prize winner Academician V.I. Goldanskiy, to talk about the organization's tasks and the questions being discussed at Tbilisi.

"The most important tasks of IUPAP," said the scientist, "are the stimulation of international cooperation in the field of physics, coordination of the most urgent research, the organization and financial support of scientific conferences, the improvement of physics education, and so on.

"The executive committee meets every year. Its last session was held last year in the capital of Norway--Oslo. Incidentally, the executive committee's session was held for the first time in our country. And not by chance in Georgia. On the one hand, this is recognition of the major scientific contributions of physicists of our republic. Scientific schools that are well known the world over, for example, low-temperature physics, theoretical physics, biophysics, and solid state physics, are working fruitfully here. On the other hand, this is the great interest in Soviet Georgian life and its successes in various economic and cultural fields.

"The union's basic activity is carried out by 19 commissions in practically all fields of modern physics. It organizes conferences of physicists, which are held all over the world, and finances many of them. Therefore, one of the most important questions of this session is the discussion of the list of physicists' conferences which it is planned to hold in 1987.

"In recent times in every science, especially physics, the importance of its application to various technical problems has been increasing. The problem of

ensuring more productive ties between the theoretical and applied aspects of physics is arising. How to organize them more effectively is one of the priority tasks facing the IUPAP."

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CSO: 1814/61

## GENERAL

### CONTROVERSY OVER YAKOVLEV HIGH PRESSURE PHYSICS EXPERIMENTS

Moscow LITERATURNAYA GAZETA in Russian 25 Jun 86 p 13

[Article by S. Ushanov: "Nothing That Pretended to Be Metal. On Who Checked the Development of an Important Direction in Physics for a Decade and How"]

[Text] This story began in 1972. At that time a group of associates of the High Pressure Physics Institute of the USSR Academy of Sciences was the first to conduct an elegant experiment with an innovation of those years--a synthetic diamond, which has the ringing name Karbonado, which literally came from the pages of a buccaneer novel. The physicists wanted to measure how great the pressure is, at which the surface of the diamond will not stand up and will collapse. It was assumed that the pressures would reach hundreds of thousands of atmospheres.

When it comes to such unthinkable pressures, our imagination draws with depressing uniformity some kinds of Cyclopean structures, skyscraper-high presses, and other similar things. The realistically thinking researchers used cunning. For pressure--let us recall our school lessons--is force divided by area. And if there are not yet forces to increase the force, should we try to reduce the area? By adding a weight to a solid point which rests against a solid plane, we reduce the area in the denominator of the pressure formula to almost zero, while the force--the weight of the balance weight--can remain moderate. By means of this it is possible to attain enormous, truly nonterrestrial pressures.

So, after having made a point and plane out of a very hard synthetic diamond, the group of physicists, which included Yevgeniy Nikolayevich Yakovlev (then only a candidate of physical mathematical sciences), conducted the experiment. Then, under a microscope they examined a hardly noticeable tiny depression, which was left by the point on the plane, measured its area, and divided the weight of the balance weight by this area. And it turned out: the pressure is 1 million atmospheres! A record! Hurrah!

A record? Had the scientists really pursued merely a seven-place number? No, of course, everything is not that simple. Although the mood of everyone in those years was really elated and beneficent. Solid state physics experienced an upsurge in popularity. Indeed, the broad public had not had time to properly get used to miniature transistors--the miracle of the second half of

the 20th century, and there were already coming off the factory conveyors increasingly complex microcircuits that soon promised to convert the heavy cabinets of television sets and the cumbersome housings of computers into miniature items resembling wrist watches. We gasped with admiration and applauded the successes of the scientific and technical revolution.

It was in those happy years, when the most audacious scientific projects seemed realizable and when successes had our heads spinning, that the solid-state physicists, who were studying the properties of substances at high pressures, were also consumed with an alluring idea--to produce metal from hydrogen. They recall that American theoretician N. Ashcroft started the trouble. He so vividly described in his hypotheses the unprecedented qualities of a mysterious hydrogen metal (concealed by nature in the depth of only the largest planets, such as Jupiter) that the American Government allocated a round sum for these studies. Academician L.A. Artsimovich's amusing definition of science: a means of satisfying a scientist's curiosity at the expense of the state, was once again confirmed. Well, of course, we also did not want to be left behind.

Incidentally, this was not just a matter of researchers' curiosity. It was presumed that hydrogen can remain a metal state even after the removal of a pressure that was a millionfold greater than our usual atmospheric pressure. And this promised enormous practical advantages: they expected that it would become the first high-temperature superconductor and would bring about a revolution in electrical engineering, that a new fantastic fuel would be produced from it, and that, finally, from this lightest metal one could produce a myriad of almost weightless components--from airplane fuselages to bullet-proof jackets.... The future technical revolution rested on the "trifle"--to raise the pressure if only to 1 million atmospheres.

And so that million was reached. And what a million! They succeeded in proving that the work could be done on comparatively inexpensive synthetic diamonds, which had been made, no less, right there, at the institute. The results elated the researchers: there was no longer the need to try to get the precious natural stone from the tight-fisted financiers. The physicists accepted the congratulations of their colleagues and planned grandiose projects. And the work got under way.

Later Yevgeniy Nikolayevich and his coauthors would publish numerous scientific articles and would start to break one record after another--but all of his results would, just like the earth on whales, rest upon those initial data of the pressure measurement. Far-reaching conclusions would be made, and stunning hypotheses would be advanced. But once, when the measurements were made more accurately, suddenly--somehow in passing--it was found that the initial data were erroneous. This became quite obvious in 1977....

It was already about to fall apart, and then a clap of thunder! No, not a thunder clap. Skeptics, who are to be found in any scientific field, were previously beset by doubts about the veracity of the original data. However, one cannot always succeed in making one's thoughts generally known. In accordance with long-standing academic tradition, scholars communicate with each other primarily through publications--it is only to these adjusted,



balanced, rather dry texts that considerable significance is attached. The most brilliant scientific tirades cannot compare in force with the printed word and in the references will be marked without fail with the precautionary notation "private communication"--like a half-truth. But it is difficult for a researcher to publish a special opinion without the consent of his supervisors: the documentation for an article must be signed by one's own management, and if the management does not share this opinion or doubt, then.... The management, after all, which included Ye.N. Yakovlev (he had already advanced from candidate to doctor of sciences and from deputy became, after the death of Academician V.F. Vereshchagin, the institute's acting director), could hardly welcome any doubts of the associates about its, the management's, scientific correctness.

We also know dozens of other levers and mechanisms that enable institute authorities to pressure recalcitrant subordinates--the wage, the dissertation, and the apartment. The solitary person, who has dared to express doubts openly about the research results of his chief, is really not to be envied: this entire considerable force of pressure is immediately concentrated on his small area, and a person, even a resolute one, is still not as hard as a diamond.

Alas, at that time there were no people within the institute, who dared to make a clear and loud admission that a mistake had been made. Even now, in relating to me these events of past days, they ask me not to mention their names in the newspaper. While one doctor of sciences, who has been working on similar problems at another institute, that is, who is not particularly dependent upon Yevgeniy Nikolayevich, said to me: "I did voice a negative opinion--but in a scientific journal. I would not want to make a statement in a newspaper. I am, after all, not a journalist--my place is in the laboratory."

Thus, an entire decade passed in circumspections, apprehensions, vacillations, and reflection. In a certain sense the "proponents" and the "skeptics" deserved each other: some did not wish to "wash their dirty linen" and were afraid to soil their hands, while others simply did not want to see this litter. By the time many persons had already understood that the initial measurement was in fact erroneous (so much the measuring technique as the striving to obtain precisely a record result at any cost let them down) the Yakovlev group had in its "war chest" more than a dozen publications, and there simply was nowhere for it to retreat. One thing remained--to prove the unprovable...or accept the desired million atmospheres as an axiom.

And so, there is--it seems that there is--a million atmospheres. Any researcher, who has gotten hold of a new powerful instrument, experiences an irresistible itch: he wants to test the innovation at once on the hardest scientific nut. And the nut--here it is: metallic hydrogen. Ye.N. Yakovlev is beginning to gradually change the course of the entire institute, by turning this giant scientific vessel by the stem toward the light of a single lighthouse that is hardly visible to him. Doubts aside, the main thing is the soberness of the hand on the wheel. And--full steam ahead! Full steam!

They did a lot of work. They placed specimens of nonmetallic substances onto a minute platform of the diamond superpress--under the point, observing what will happen with them at pressures of a million of atmospheres. They regretted that the design of the experiments does not allow reliable recording of the state of the compressed material, but did not despair: the metal **SHOULD** [in boldface] exist. They stood fast--the already disbursed scientific advance obligated them to continue, and the general "solid-state" euphoria of those years roused them. They measured the electrical resistance of the compressed material: if it suddenly fell that would mean that there really is a conductor, a metal under the point. And they wanted this to happen so badly that the inflexible reality of the physical world, as if in a telekinetic seance, yielded to, obeyed the insane wish of the experimenters.

They did it! As if by the wave of a magic wand, the substances--hydrogen and diamond, table salt and water--all in unison obediently were transformed under the hands of the researchers into metals. The victory gained over the despicable skeptics was complete. Perhaps, even too complete: precisely this non-stop kaleidoscope of the turning of everything real into metal finally caused some serious doubts among many of the world's physicists and gave rise to the joke, which was well known at that time in scientific circles, that Ye.N. Yakovlev could turn even an absolute vacuum into metal.

In the meantime world science was not standing in place. During the decade, while this institute headed by its acting director amused itself by playing inexpensive (in every sense) games with synthetic diamonds, the practical Americans, who can count money no worse than we can, developed a much more expensive, but far more reliable and objective method--experimentation with natural diamonds whose transparency made it possible almost with the unaided eye to keep track without difficulty of what is happening there, under the point. They developed it and demonstrated that even at pressures of almost 2 million atmospheres neither hydrogen, nor nitrogen, nor ruby, nor diamond still does not become, to everyone's regret, metals. They reported this at last year's international conference in Amsterdam. Then, what did we have?, the reader might ask. Now many say with confidence that Ye.N. Yakovlev never did produce any kind of metal--there was a trivial short circuit of the electrodes....

Did Yevgeniy Nikolayevich himself suspect earlier the fiasco that befell him? That is difficult to judge, although suspicions could not but have arisen deep in his heart. But suspicions are one thing, while duty is another thing, and life is yet something else. While the ways to serious scientific journals with time were complicated more and more by the "intrigues" of the growing scientific opponents, nothing prevented for the time being the winning round of public opinion through the conventional publications designed for laymen. And then during 1974-1980 a powerful swell of the popularization of the new "achievement" in physics spread.

"The broad publicity campaign organized by Ye.N. Yakovlev,...in the course of which it was reported that it had been possible to convert hydrogen into a metal state..., did great harm to Soviet science," writes A.M. Prokhorov, academician secretary of the General Physics and Astronomy Department of the

USSR Academy of Sciences. "A flood of articles on the conversion of newer and newer substances into the metal state were published...."

It is a matter not just of the years that had passed uselessly, like water from an opened hand. Not so much quantity as quality was lost. In time people started to look upon the acting director's scientific activity with unconcealed smiles--at the institute, outside it, and even abroad. The academic institute, which is the main one in the field of high pressure physics, was gradually being turned into a laughing stock--its associates are themselves now saying this. The best personnel were leaving, while many of those who stayed were already demoralized people: if the authorities demanded, they, having forgotten their past doubts, would start working on the same depressing ideas. All the more so because all the secondary direction that interfered with the "general line" were assiduously eradicated.

A unique press that generates an enormous force--50,000 tons--was constructed at the institute through the efforts of L.F. Vereshchagin. By means of it they intended to reach ultra-high pressures in large chambers since this is closer to future practice and makes it possible to track physical processes more confidently than experiments "on the tip of a diamond needle." The press also has a number of other uses, but for 10 years now--since the death of the academician--this technical wonder has sat unequipped, almost completely idle. The press has become a unique melancholy symbol of the "lost decade." The very first thing that the yearning eye of an unconcerned holiday visitor notices as he travels from Moscow along the Kaluga Highway, is the giant concrete cubic building of the Big Press. The press forgotten in the bustle. It is said that the building's facade was until recently decorated with a cheerful slogan glorifying science. Later, the sign was bashfully removed....

Yes, that is the inevitable punishment of a scientist and scientific collective for, it would seem, small, but irreversible compromising concessions. I do not intend to moralize here (these days, moreover, it is just too easy to do this from the sidelines). I am sure that nearly every one of scientists, who consented tacitly or not tacitly, whispered in a Galilean fashion: "But all the same it revolves!...", and consented.

It is, after all, not a matter of supplemental appeals for universal adherence to principles--there are enough of them. But a matter of creating in science such conditions, under which unprincipled persons simply cannot survive as scientists. Perhaps, this essential process has in part already begun, and evidence of this is the appeal of the institute staff members themselves to the newspaper (true, for the present it is still anonymous). That, too, would not have happened in earlier years.

It remains to be asked: Well, what about the Academy of Sciences? How could it have allowed the desecration of science to go on for such a long time? Is it possible that no one saw anything? They did see. That is proven by the earlier quoted words of Academician A.M. Prokhorov. Here is what is the most surprising. Back in 1978 the bureau of the General Physics and Astronomy Department made a decision to relieve Ye.N. Yakovlev of the held position. Here we are in 1986, but that decision has simply remained on paper.

In January of this year, the bureau of the department confirmed its 8-year old decision, and 1 month later A.M. Prokhorov sent a letter to the leadership of the USSR Academy of Sciences, in which he wrote that much time has slipped by and the acting director should be relieved of his duties immediately.

In the meantime the time "being allowed to slip by" continues to pass irreversibly....

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CSO: 1814/54

RSFSR COUNCIL OF MINISTERS DECREE TECHNOLOGY PRIZES

Moscow SOBRANIYE POSTANOVLENIY PRAVITELSTVA RSFSR in Russian No 14, 1986 p 265

[Decree No 98 of the RSFSR Council of Ministers of 10 March 1986, "On One-Time Prizes of the RSFSR Council of Ministers for the Development and Assimilation of Highly Efficient Equipment, Advanced Technology, and New Materials"]

[Text] The RSFSR Council of Ministers decrees:

1. To establish 20 one-time prizes of the RSFSR Council of Ministers, which have been approved by the USSR State Committee for Science and Technology, the USSR State Committee for Labor and Social Problems, the USSR Finance Ministry, and the All-Union Central Council of Trade Unions, for the development and assimilation of highly efficient equipment, advanced technology, and new materials the following amounts: 1 prize from 26,000 to 40,000 rubles, 4 prizes from 15,000 to 25,000 rubles, and 15 prizes from 3,000 to 14,000 rubles.

2. To ratify the proposed Statute on One-Time Prizes of the RSFSR Council of Ministers for the Development and Assimilation of Highly Efficient Equipment, Advanced Technology, and New Materials, which has been approved by the All-Union Central Council of Trade Unions.

[Signed] Chairman of the RSFSR Council of Ministers V. Vorotnikov

Administrator of Affairs of the RSFSR Council of Ministers I. Zarubin

Moscow, 10 March 1986. No 98.

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## BIOGRAPHIC INFORMATION

### UMIRBEK USPANOVICH USPANOV

Alma-Ata VESTNIK AKADEMII NAUK KAZAKHSKOY SSR in Russian No 8, Aug 86 p 75

[Article under the rubric "Anniversary Dates": "The 80th Birthday of Corresponding Member of the KaSSR Academy of Sciences U.U. Uspanov"]

[Text] Corresponding Member of the KaSSR Academy of Sciences and Honored Figure of Science of the KaSSR Academy of Sciences Umirbek Uspanovich Uspanov has marked his 80th birthday and 55 years of scientific and public activity.

U.U. Uspanov was born on 10 August 1906. Following the completion in 1936 of special graduate studies of the USSR Academy of Sciences, to which he was assigned in conformity with a decision of the Kazakh Kray Committee of the All-Union Communist Party (Bolshevik) and the Presidium of the USSR Academy of Sciences on the training of scientists for the Kazakhstan base of the USSR Academy of Sciences, he worked as a soil scientists at the Kazakhstan Base of the USSR Academy of Sciences, which in 1938 was reorganized into the Kazakh Affiliate of the USSR Academy of Sciences. From 1939 to 1942 he was a senior scientific associate and director of the Dzhezkazgan Experimental Station of the Kazakh Affiliate of the Academy of Sciences. As Deputy Chairman of the Kazakh Affiliate of the USSR Academy of Sciences from 1942 to 1946, U.U. Uspanov exerted considerable efforts to consolidate the existing scientific institutions and to organize new ones and actively participated in all the preliminary work on the organization of the Institute of Soil Science of the Kazakh SSR Academy of Sciences, which became the coordinating center for soil research in the republic, was established. U.U. Uspanov was its continuous director for more than 23 years.

Under the supervision and with the direct participation of U.U. Uspanov the collective at the Institute of Soil Science of the Kazakh SSR Academy of Sciences performed large-scale and substantively significant soil-geographic, land reclamation, field station, and laboratory studies of Kazakhstan soils. Soil maps were compiled for all 19 oblasts of the republic, and a multicolored soil map of the KaSSR was published. The scientific principles of the classification, diagnosis, and agro-production grouping of soils were developed and the quantitative-qualitative composition of soil resources and the reserves of arable land for their agricultural development were identified. On the basis of the theoretical generalization of materials 14 issues of the series monograph "Pochvy Kazakhskoy SSR" [Soils of the Kazakh

SSR] were published. U.U. Uspanov headed the procedural and broad soil research operations on the selection of arable virgin and long-fallow lands for their development and the organization of new grain farms (1954). The operation largely facilitated the progress of agricultural production and the transformation of Kazakhstan into the most important granary of the country for the production of commercial grains.

U.U. Uspanov is the author of about 100 scientific works. Many of his scientific developments have been incorporated into fundamental monographs on the soils and land resources of the Soviet Union and survey soil maps of the USSR, Asia, and the world.

U.U. Uspanov's work as a scientist and organizer of science has been rated highly in the scientific community in our country and abroad. For services in the development of science and active participation in the elaboration of questions of the development and rational exploitation of Kazakhstan soil, he was awarded the Orders of Lenin and Labor Red Banner (twice), the Badge of Honor, many medals of the Soviet Union, certificates of the Kazakh SSR Supreme Soviet, and gold medals of the Exhibition of National Economic Achievements. The friends, colleagues, and pupils of the celebrator wish him good health and new creative accomplishments.

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YELIZAVETA IVANOVNA PONOMAREVA

Alma-Ata VESTNIK AKADEMII NAUK KAZAKHSKOY SSR in Russian No 8, Aug 86 p 76

[Article under the rubric "Anniversary Dates": "The 70th Birthday of Corresponding Member of the KaSSR Academy of Sciences Ye.I. Ponomareva"]

[Text] The 70th birthday and 48th year of scientific work of Corresponding Member of the KaSSR Academy of Sciences Doctor of Technical Sciences Professor Yelizaveta Ivanovna Ponomareva were marked on 30 August 1986.

After her graduation from the Sverdlovsk Industrial Institute, Ye.I. Ponomareva worked as an engineer at chemical enterprises in the Urals and starting in 1940 as a laboratory assistant of the Kazakh Mining and Metallurgical Institute. All of the scientific activity of Ye.I. Ponomareva has been associated with the Institute of Metallurgy and Ore Dressing of the Kazakh SSR Academy of Sciences, where she began to work in the position of scientific associate and since 1952 has been in charge of the Laboratory of the Hydrochemistry of Rare and Trace Elements.

The main directions of Ye.I. Ponomareva's scientific research are the elaboration of the fundamental principles of flow sheets of the extraction of rare and trace elements with the complete use of ores and concentrates of Kazakhstan. A series of studies on alkaline hydrometallurgy allowed her to devise and propose original technological designs as applied to a large number of metallurgical products.

The scientific works of Ye.I. Ponomareva on the solution of the problems of the complete processing of ore resources are of considerable national economic significance: the production of cadmium and a number of trace elements was set up with her direct participation at the Chimkent Lead Plant. It was here at the Balkhash Mining and Metallurgical Combine, that the production of rhenium salts was set up. The principles of the sorption-extraction technology of extracting trace rare metals (rhenium, indium, and gallium) from intermediate products and waste products of the metallurgical and chemical industries of Kazakhstan were developed under the supervision of Ye.I. Ponomareva. Her theoretical studies on the oxidation of chalcogenide materials in aqueous media served as the basis for developing promising electrochemical processes for leaching substandard concentrates and intermediate products of metallurgical plants.



She is the author of more than 300 published works, including 4 monographs, 43 inventor's certificates, and 6 patents (the United States, Japan, Canada, France, Hungary, and the GDR).

Ye.I. Ponomareva is devoting considerable attention to the training of skilled scientific personnel. Under her supervision 18 candidate dissertations have been prepared and defended. Yelizaveta Ivanovna is devoting much energy and effort to scientific organizational and public work.

For her considerable contribution to the development of domestic metallurgical industry Ye.I. Ponomareva was awarded prizes of the USSR Council of Ministers, the medals "For Valiant Labor in the Great Patriotic War of 1941-1945" and "For Valiant Labor. In Commemoration of the 100th Anniversary of the Birth of Vladimir Ilyich Lenin," as well as commendation certificates from the KaSSR Supreme Soviet.

We wish Yelizaveta Ivanovna further fruitful activity which is aimed at the development of Soviet science and the welfare of our homeland.

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VASILIIY VASILYEVICH ZAKUSOV OBITUARY

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian No 4, Jul-Aug 86, pp 124-127

[Article under the rubric "Obituary": "In Memory of Vasiliiy Vasilyevich Zakusov"]

[Text] The prominent scientist, gifted organizer of science, and person of great charm Vasiliiy Vasilyevich Zakusov died on 4 January 1986. He was ardently enthusiastic about pharmacology, to which he devoted his entire brilliant and active life. V.V. Zakusov was infinitely dedicated to science. He was distinguished by an extraordinary breadth of scientific interests and an amazing capacity to perceive and implement all that was new and advanced. Important scientific directions, the founding of a major scientific school, the organization of the Pharmacology Institute and the All-Union and International Scientific Societies of Pharmacologists and many other accomplishments are connected with the name of VasiliiyVasilyevich.

Vasiliiy Vasilyevich Zakusov was born in Leningrad on 26 April 1903 in the family of a military physician. He received his secondary education at the 13th Soviet School in Leningrad and his higher education at the Military Medical Academy (MMA), from which he graduated in 1926. After graduation from the academy he served as a junior physician at the Military Theoretical School of Air Force Pilots. In 1931 he transferred to a job at the MMA, where he successively held the posts of junior instructor, instructor, and senior instructor in the Pharmacology Chair. In 1937 he was elected head of the Pharmacology Chair of the 3d Leningrad Medical Institute. He held both posts until the end of 1939, when he was appointed chief of the Pharmacology Chair of the Kuybyshev MMA. In 1942 he was transferred to the position of senior instructor in the Pharmacology Chair of the MMA imeni S.M. Kirov, which he held until he was transferred to the army reserve in 1951. In 1944 he was competitively selected as head of the Pharmacology Chair of the 1st Leningrad Medical Institute. In 1954 he became the head of the Pharmacology Institute of the USSR Academy of Medical Sciences, of which he remained director until 1979. Between 1956 and 1964 he headed the Pharmacology Chair of the 1st Moscow Medical Institute imeni I.M. Sechenov.

V.V. Zakusov began his scientific work in the laboratory of N.P. Kravkov while a second-year student at the MMA. Since that time his entire life has been devoted to the study of urgent pharmacology problems. In 1935 he received the

academic degree of candidate of medical sciences without a dissertation defense. In 1936 he defended his dissertation on the theme "Respiratory Reflexes During Vascular Intoxication in Various Vascular Regions" and received the academic degree of doctor of medical sciences. In 1938 the academic title of professor was conferred upon him. In 1948 he was elected a corresponding member of the USSR Academy of Medical Sciences and in 1952 an academician of the USSR Academy of Medical Sciences.

The first period of V.V. Zakusov's creative life was spent at the pharmacology chairs of the MMA's in Leningrad and Kuybyshev and at the 1st and 3d Leningrad Medical Institutes. Here the foundations of the most significant direction of the work of V.V. Zakusov and his students--the pharmacology of synaptic transmission--was laid. These studies, which gained world recognition, were summarized in the monographs "Eksperimentalnyye dannyye po farmakologii tsentralnoy nervnoy sistemy" [Experimental Data on the Pharmacology of the Central Nervous System] (1947), "Farmakologiya nervnoy sistemy" [Pharmacology of the Nervous System] (1953), and "Farmakologiya tsentralnykh sinapsov" [Pharmacology of Central Synapses] (1973; in 1980 it was published in England by Pergamon Press). In 1976 V.V. Zakusov was awarded the Lenin Prize for his outstanding research in the field of neuropharmacology and the elaboration of the synapse theory for the action of neurotropic agents.

A significant landmark in the history of Soviet pharmacology was the establishment of the Pharmacology Institute in 1952 within the system of the USSR Academy of Medical Sciences, of which V.V. Zakusov was one of the founders and continuous director over a period of 25 years. It was here that his extraordinary organizing capabilities and exceptional sense of the new in science were manifested. The work of the institute was aimed at the accomplishment of two priority tasks of Soviet medical science: the search for agents to treat cardiovascular and neuropsychic diseases and the study of the mechanisms of their action. V.V. Zakusov saw in the development of new drugs one of the most important tasks of pharmacology, inasmuch as in this the connection between basic research and practice finds reflection and real assistance to public health is realized. As is known, the study of the dependence of the pharmacological effect on the chemical structure and physical chemical properties of physiologically active substances is of the greatest importance for the search for new pharmacological agents. These studies received the broadest development at the Pharmacology Institute of the USSR Academy of Medical Sciences, where, thanks to the efforts of V.V. Zakusov, the necessary base was created and a collective of researchers, which worked enthusiastically in this direction, was formed. Vasilii Vasilyevich exerted much energy and persistence to introduce scientific achievements into practice. A number of effective preparations were synthesized, studied pharmacologically, proposed for clinical application, and introduced in commercial production by chemists and pharmacologists under his supervision and with his direct participation. Among them are agents used in general medical practice for general and local anesthesia (sodium oxybutyrate, trimecaine HCl, hygronium, and anatruxonium), preparations for treating mental illnesses (Phenazepam, Phthoracizinum, Carbidine, lithium oxybutyrate, ethaperazine, and others), medicines used for coronary insufficiency (chloracizine, nonachlazine) and for cardiac arrhythmias (ethmozine and ethacizine), and others.

Within a short period of time the Pharmacology Institute of the USSR Academy of Medical Sciences under the supervision of V.V. Zakusov became the center of scientific pharmacological thinking in our country and earned a merited international reputation. The institute implemented the coordination, planning, and forecasting of pharmacology research for the entire Soviet Union. While heading for many years the Problem Commission for Pharmacology attached to the Presidium of the USSR Academy of Medical Sciences, V.V. Zakusov contributed to a significant increase in the level of pharmacology research at scientific research institutes of the union republics and at pharmacology chairs of medical institutes.

V.V. Zakusov attached great importance to comprehensive studies with clinical specialists, which are necessary for the evaluation of new drugs and the study of the peculiarities of their effect on the human body. Studies in clinical pharmacology were undertaken in our country on his initiative. He was also the initiator, editor, and direct participant in the publication of the first Soviet Manual on Clinical Pharmacology (1978).

Vasiliy Vasilyevich made a considerable contribution to the cause of training many generations of physicians, for more than 30 years engaging in educational activity and heading pharmacology chairs in Leningrad, Kuybyshev, and Moscow. He published two editions of the textbook "Farmakologiya" [Pharmacology] (1960, 1966) and a number of teaching aids.

V.V. Zakusov's services in the training of scientists have been considerable. He has trained more than 10 professors, 30 doctors of sciences, and approximately 50 candidates of sciences, among whom are representatives of the union republics and scientists from a number of socialist countries. V.V. Zakusov established his own scientific school. His pupils are heads of many pharmacology chairs and laboratories at medical institutes and scientific research institutions of Moscow, Leningrad, and other cities of the country.

V.V. Zakusov gave much energy to strengthening the reputation of Soviet pharmacology in world science. On his initiative the All-Union Scientific Society of Pharmacologists became a collective member of the International Union of Pharmacologists (IUPHAR). For many years V.V. Zakusov was a member of the executive committee and vice president of IUPHAR. Vasiliy Vasilyevich had exceptionally great scientific prestige. He was elected a foreign member of the GDR Academy of Sciences, a corresponding member of the Academy of Pharmacy of France, an honorary doctor of the Zemmelveiss University in Budapest, an honorary member of the GDR Society of Pharmacologists and Toxicologists, the Hungarian Society of Pharmacologists, and the Purkyne Society (CSSR).

V.V. Zakusov was engaged in diversified public work. He was the initiator of the establishment in 1960 of the independent All-Union Scientific Society of Pharmacologists and was its continuous chairman until the last days of his life. For many years he was a member of the editorial board of the journal FARMAKOLOGIYA I TOKSIKOLOGIYA and was its editor in chief from 1951 to 1953. In addition, V.V. Zakusov was deputy editor in chief of the journal BYULLETEN EKSPERIMENTALNOY BIOLOGII I MEDITSINY, an editor of the pharmacology section

of the Great Medical Encyclopedia, and a member of the editorial board of the International Encyclopedia of Pharmacology and Therapy. For a long period of time Vasilii Vasilyevich was the USSR representative to the UN Commission on Narcotics, and later an expert of the World Health Organization.

The scientific teaching and public activity of Academician of the USSR Academy of Medical Sciences V.V. Zakusov was rated highly. He was awarded the high titles of Lenin Prize winner, USSR State Prize winner, Honored Figure of Science of the RSFSR, and winner of the N.P. Kravkov Prize of the Presidium of the USSR Academy of Medical Sciences. He was also awarded the Order of Lenin, the Red Banner Order, the Order of the Patriotic War, the Order of Labor Red Banner, the Badge of Honor, and many medals.

Vasilii Vasilyevich was a highly principled, honest, and sincere person who always regarded the interest of his work to be a matter of paramount importance. He was very demanding of himself and his associates. At the same time he was always a loyal friend and attentive teacher, who never left his friends and pupils when they were in trouble.

A person of exceptional courage, while terminally ill and knowing the incurability of his disease, Vasilii Vasilyevich Zakusov continued to work actively and preserved his characteristic cheerfulness and benevolence until the end.

Vasilii Vasilyevich Zakusov will forever be remembered by all who knew and loved him not only as an outstanding pharmacologist, but also as a person of great heart and a patriot of our great homeland.

[Signed] All-Union and Moscow Scientific Societies of Pharmacologists

Editorial Board of the journal FARMAKOLOGIYA I TOKSIKOLOGIYA

Pharmacology Institute of the USSR Academy of Medical Sciences

Pupils and friends

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